FOUNDRY TRADE JOURNAL

EST. 1902

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NOVEMBER 9, 1961

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2

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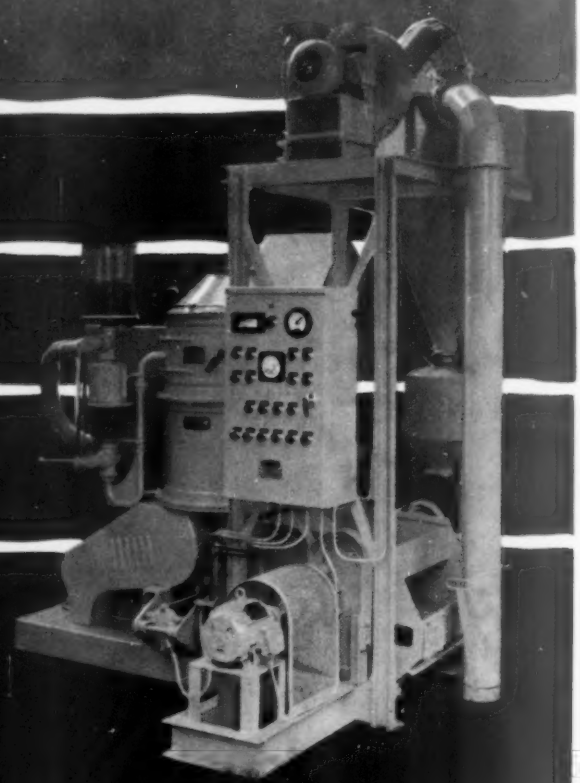

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	Sorelmetal D-I	Sorelmetal F-I
Carbon	2.40 %	4.25 %
Sulphur	0.025	0.015
Phosphorus	0.025	0.025
Silicon	0.08	0.08
Manganese	0.009	0.009

RESIDUAL ELEMENTS

	%		%		%
				Aluminium	0.015
Chromium	0.035	Titanium	0.020	Tungsten	0.001
Copper	0·025	Vanadium	0.025	Molybdenum	0·001
Nickel	0.085	Cobalt	0·040	Tin	0.001

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A

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Hicycle tools are of special interest to you

Here's why

- **INCREASED PRODUCTION** A constant speed is maintained irrespective of load.
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- **GREATER ECONOMY** A Hicycle tool uses only a fraction of the power of a comparable compressed air tool.
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It's a worker that never flags.... it maintains a constant grinding speed, whatever the load. This means far less operator fatigue and much more output per shift—often as much as 50% extra—compared to conventional power tools. Hicycle electric tools are available for most heavy-duty rotary operations, and are hard at work in virtually every industry. The Hicycle catalogue will be gladly sent on request.

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CP259

the pools

". . . and I might at that if a couple of teams I could mention were to buy themselves some decent centre forwards.

"Football is a funny game. One week a club is a world-beater and yet a few days later they can be licked to a frazzle by a team from a girls' school.

"Heaven help us if we carried on that sort of caper at AW. Customers don't want firms that are up one minute and down the next. When buyers come to a company with our reputation they expect—and get—a reliable performance. Fancy telling them that a load of pig wasn't up to specification because one of our furnacemen was off form!

"I reckon I'd get a coupon up every week if footballers were only half as consistent as the AW team."

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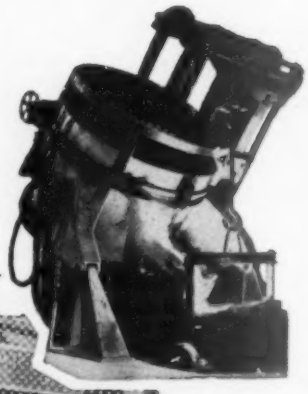

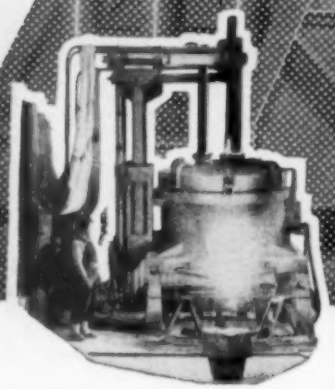

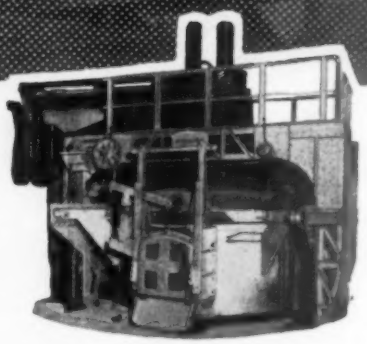

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• • • • • **Add charges for tip.**

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Escher Hot Blast Cupola

(Courtesy of International Harvester, Australia)
External view of recuperator of Escher H.B. installation, output 10-ton/hour. Customer reports one cleaning and no maintenance in five years daily operation.

Four Escher H.B. Installations are now in operation, with outputs from 6 to 17-ton/hour Three more, with outputs of 15 and 25-ton/hour, are due to be started up later this year, including a British installation.

Principal advantages of the Escher H.B. system are.

Starting from cold is simple and quick.

No cleaning necessary.

Up to 100% of top gas can be utilised, including blow-down period.

Cupola can be operated with acid, basic or neutral slag.

Simple, water-cooled, long-life tuyeres are used.

Water-cooled jackets reduce lining and maintenance cost.

Vertical recuperator lends itself to a compact and economical layout reducing installation cost.

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Less dust carried into the atmosphere.

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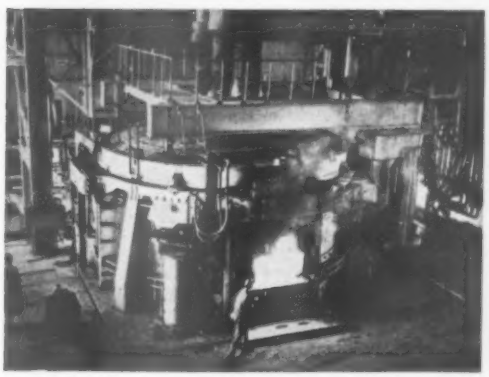
G.W.B. Lectromelt 36,000 kVA Steel Melting Arc Furnace with 24' 0" diameter shell



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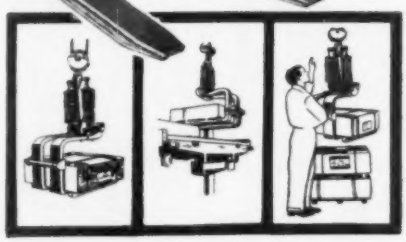
The 'Wedco' Wire Belt Sling has the strength of steel combined with maximum flexibility and a wide bearing surface giving exceptional load stability. Made from thousands of strands of sturdy woven wire in a smooth transverse loop construction, 'Wedco' Wire Belt Slings cannot snap or tear. Made in a variety of sizes and capacities from 1 to 15 tons.

U.K. Patent No. 795489. Others pending.

The above illustrations show three Typical Applications, the Sling on the left being Rubber covered to prevent load damage.

TEMPLEWOOD *Spring Balanced* CRANE FORKS

Replacing chains and 'C' frames the 'Templewood' Crane Fork is faster, safer and more manoeuvrable. It is ideal for use in confined spaces and particularly in gangways too narrow for fork-lift trucks; resulting in an increase of storage space up to 50%. The 'Templewood' Crane Fork can be supplied of suitable capacity and dimensions for your particular load.
U.K. Patent No. 752471. Others pending.



Three examples of simplified handling in confined and awkward places. The 'Templewood' Spring Balanced Crane Fork is the answer to many handling problems.

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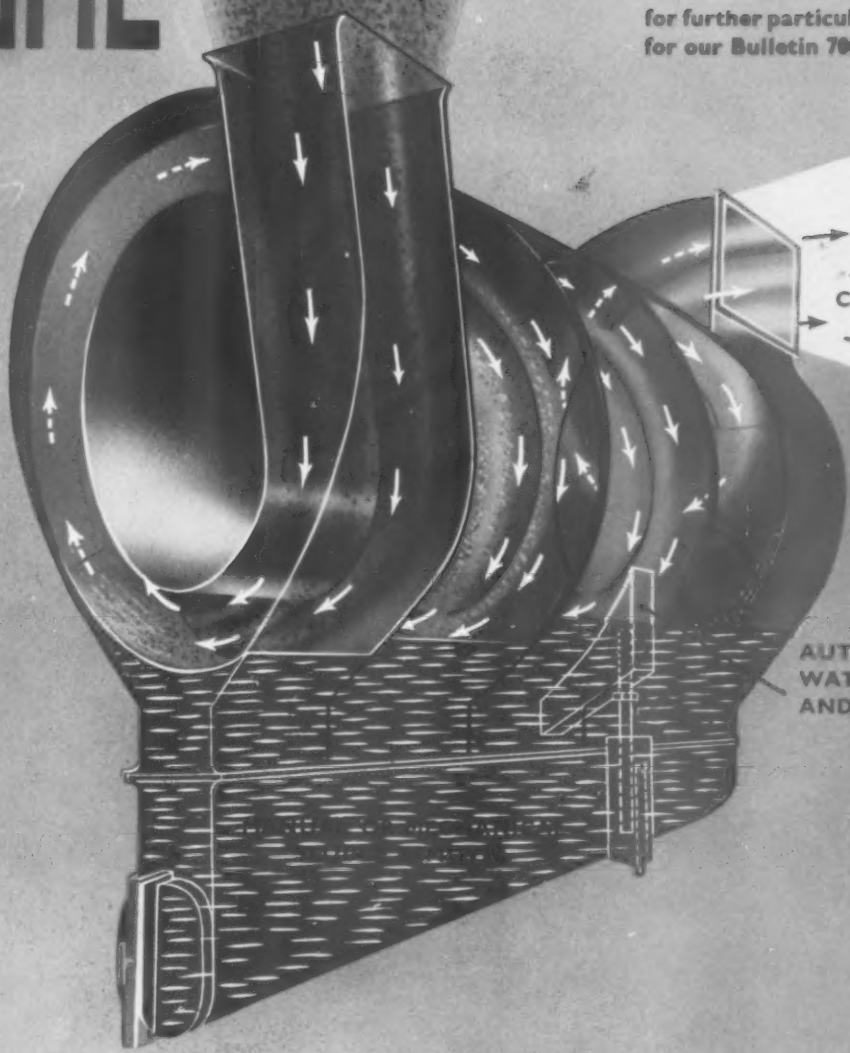

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B

Sterling boxes in a world-famous foundry

At the Carron Company's world-famous foundries at Falkirk, tunnel segments for the new Linthouse-Whiteinch Tunnel under the Clyde are now being cast in Sterling rolled steel moulding boxes. The weight of the castings is approximately 15 cwt. per section and the box dimensions are 30in. by 95in., cope 9½in. deep and drag part 22½in. deep.

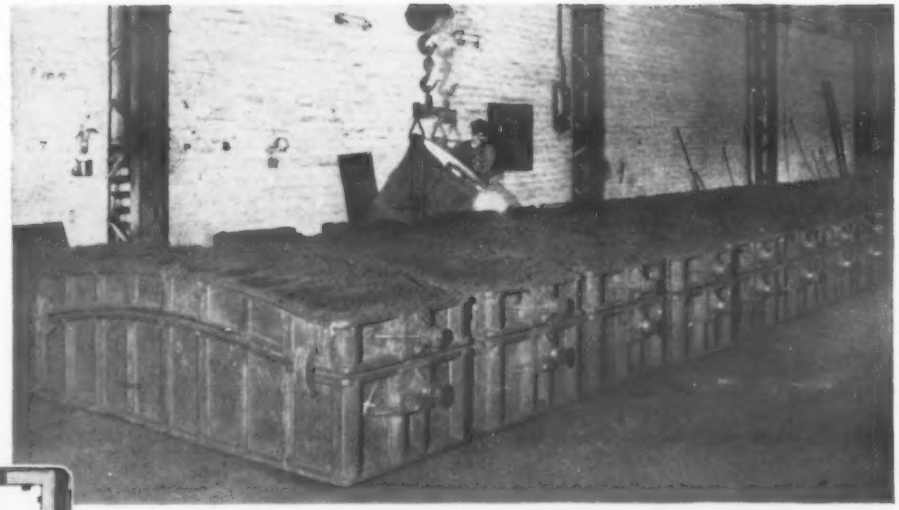

Illustration shows the type of box used for this operation.

618 Cogent

Sterling MOULDING BOXES

STERLING FOUNDRY SPECIALTIES LIMITED, BEDFORD.

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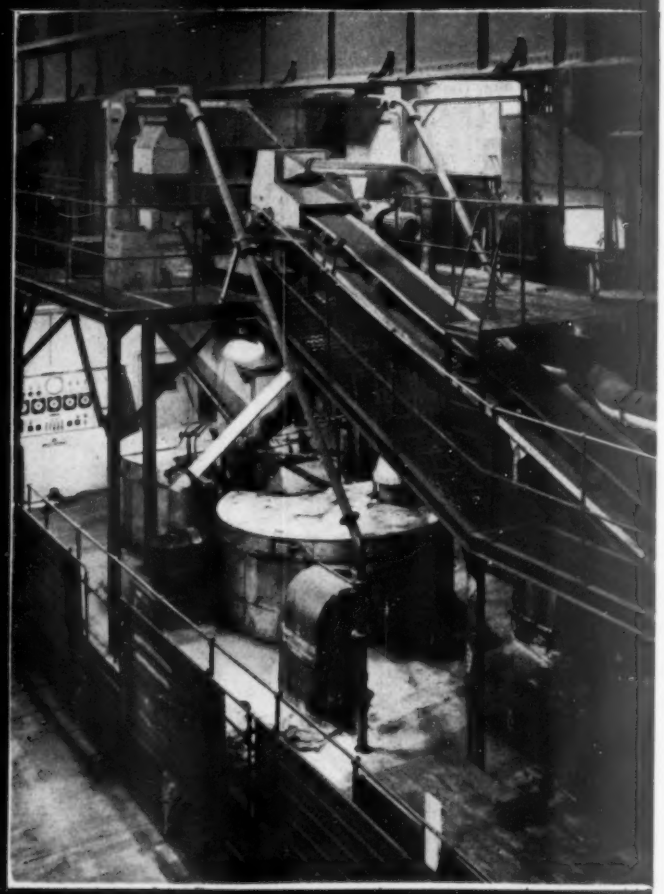

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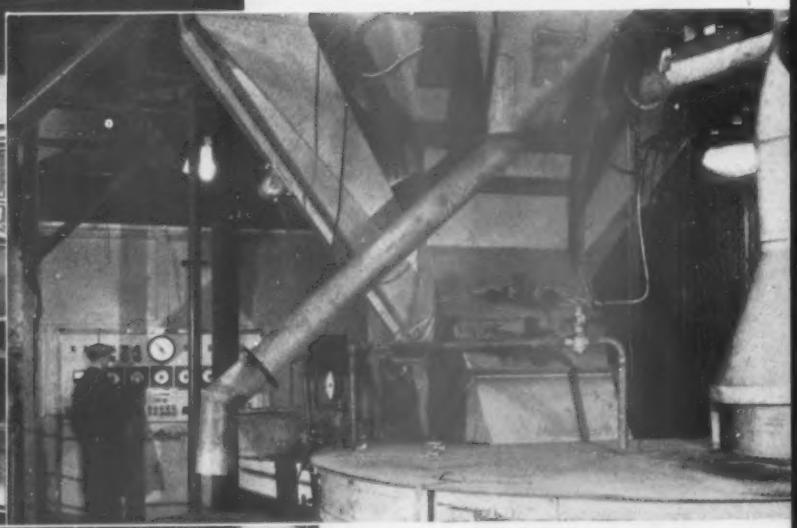

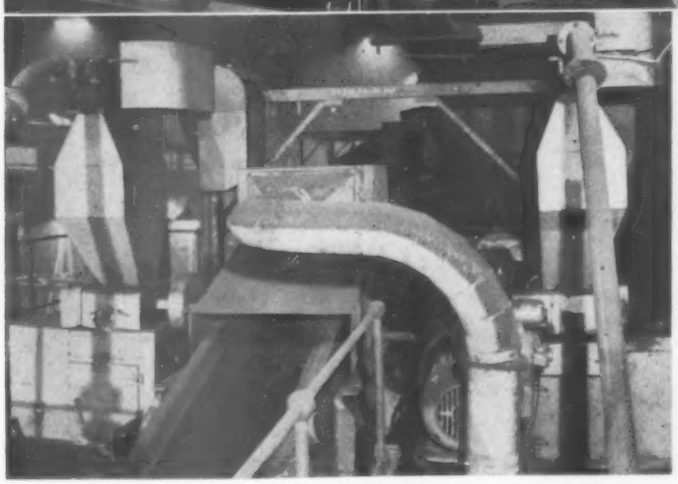

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Nº 7 'FULBOND' in semi-synthetic moulding sands

A semi-synthetic sand is generally regarded as a mixture of natural and silica sands, in varying proportions. For certain classes of work, two or more foundry sands when blended together, give much better results than would either used separately. This type of sand is a useful compromise between natural and synthetic sands and fits many foundries where synthetics cannot be used.

Semi-synthetic sand increases the flexibility of jobbing foundry practice. It should be milled frequently, however, as the inclusion of silica sand tends to dilute the strength of the natural sand. Silica sand may be added as a calculated addition, or by allowing burnt core sand to enter the system at knockout. FULBOND will restore the moulding properties as required.

The amount of FULBOND to be added will depend on:

1. The clay content and bond strength of the natural base sand.
2. The proportions of new natural sand, reclaimed moulding sand and new silica sand.
3. The requisite working moisture.
4. Milling time.

The principal advantages of a semi-synthetic sand are to increase permeability and plasticity and to reduce temper moisture.

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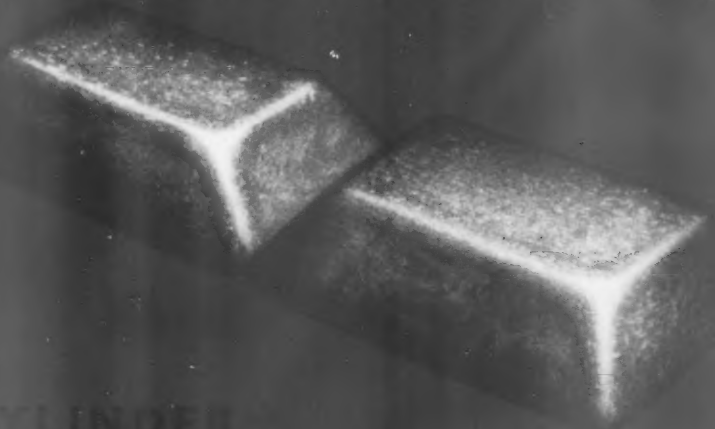

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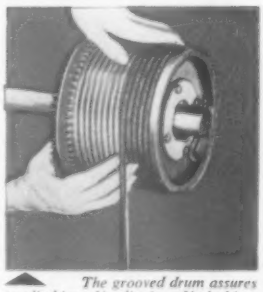
POSITIVE AIR BRAKE

A positive air brake which releases when the throttle opens is automatically applied as the throttle closes. The load cannot fall if the air line breaks or the compressor shuts down while the hoist is in operation.

EQUIPPED WITH WORM GEAR DRIVE

The positive worm, driving in both directions, in addition to the shifting eccentric used in the motor, permits the location of the load in any exact position. This ability to locate the load is absolutely necessary in handling foundry flasks, setting up automobile bodies in position on the assembly track, or setting up work for machine operations.

R57



The grooved drum assures no climbing. No slipping. No jerking. No frayed and dangerous cable. The cable ends are widely separated when the cable is down, thus preventing the load from twisting and winding up.

The motor: Famous Thor Tools Ltd. Close-Quarter type Motor with non-leakable seat throttle. Double-acting pistons cushioned at both ends of stroke to further reduce vibration.

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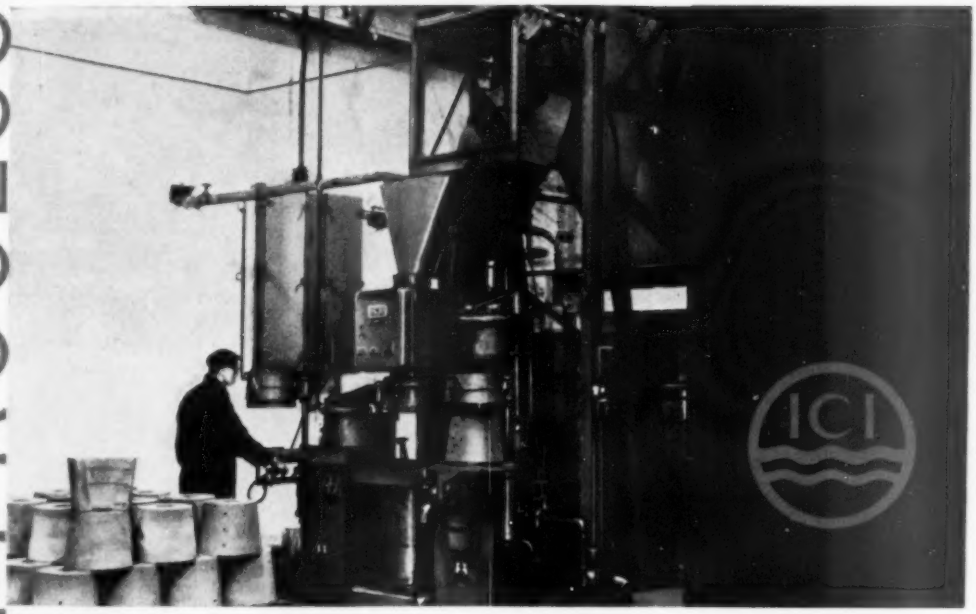
CO_2 SILICATE PROCESS
CO_2 SILICATE PROCESS



DISTINGTON STREAMLINE PRODUCTION WITH I.C.I. PRODUCTS AND THE CO_2/SILICATE PROCESS

Distington Engineering Co. Ltd. are one of Britain's largest foundries—and one of the most go-ahead. They use I.C.I. products and the CO_2/silicate process for the production of runner and feeder bushes. The dry sand method of producing these bushes was cumbersome and time-consuming, and as bushes made in silicate-bonded sand gave good results, Distington adopted the process and set out to streamline production.

Using a Hansberg core-shooting machine, modified to their special requirements, Distington have now mechanised the manufacture of the bushes. Production is automatically controlled from the time the core boxes are moved on to the machine until the completed bush is lifted clear. Accurate regulation of the gassing operation ensures that wastage is reduced to the minimum, and the mechanical handling of the bushes means that a high rate of production can be maintained by the operator. The hardness of silicate-bonded bushes allows them to be stacked on pallets, and so their distribution throughout the foundry is a simple matter.

To Distington, I.C.I. products and the CO_2/silicate process mean speedy, regular production, and reduced labour and material costs. Distington installed I.C.I.'s 5-ton CO_2 tank in order to buy CO_2 the cheapest way—as liquid in bulk. For maximum convenience and economy they have also installed two tanks for the bulk storage of I.C.I. sodium silicate, and they use I.C.I. isopropanol to prepare mould and core dressings. In short, Distington have found that I.C.I. products and the CO_2/silicate process save them time and money.

IMPERIAL CHEMICAL INDUSTRIES LTD., LONDON, S.W.1.

I.C.I. PRODUCTS AND THE CO_2/SILICATE PROCESS

The Distington Engineering Co. Ltd. and many other modern foundries use the CO_2/silicate process because it eliminates stoving, cuts fuel costs, cuts handling charges, saves time, and increases output. I.C.I. supplies for the CO_2/silicate process:

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'Drikold' solid CO_2 used in the 'Drikold' liquefier—a convenient source of CO_2 for smaller foundries.
Liquid CO_2 in bulk and I.C.I.'s 5-ton storage tank—recommended for the larger foundry.

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grades C.112 and C.125—supplied in 10- or 45-gallon drums, and in road or rail tank vehicles.

ISOPROPANOL
for the preparation of ignitable mould or core dressings. Refined isopropanol or 'Imsol' A (isopropanol/water azeotrope)—supplied in 45-gallon drums or in road or rail tank vehicles.

TECHNICAL SERVICE
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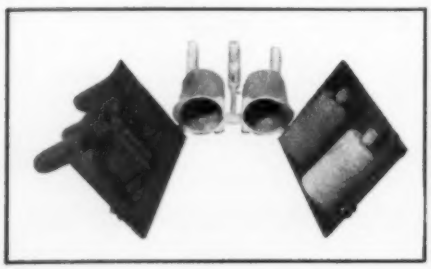
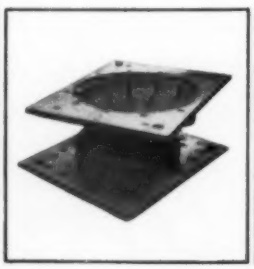
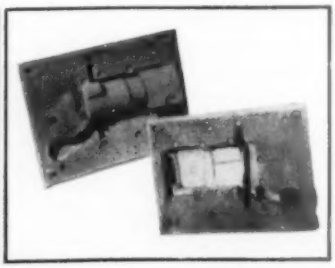
A fine powder phenolic resin for Dry-mix shell moulding



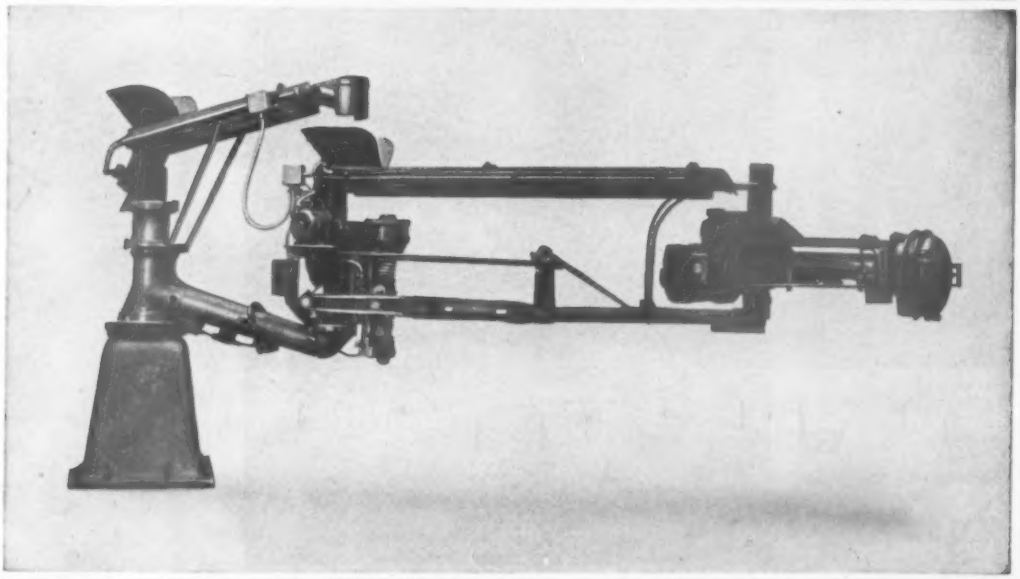




RCL 60

Sandslinger

AT DURGAPUR



We are privileged to have supplied the SANDSLINGERS to the Iron and Steel Foundry. Illustrated above is the 3 part arm Stationary Type Machine for the production of ingot moulds.

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Telephone: SOUTH 2283

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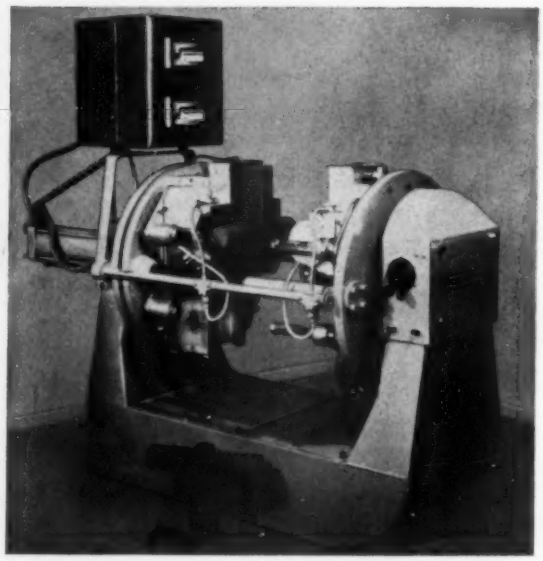
D

POLYGRAM MANIPULATORS FOR SHELL MOULD AND COREMAKING



Polygram Manipulators are the ideal method for handling large shell coreboxes (up to a maximum size of 28in. by 18in.) since they offer the following advantages:—

Full pneumatic operation from closing box to ejection of core.

Automatic control of operation if desired.

Temperature of each half of corebox electrically regulated within $\pm 5^{\circ}$C.

Can be used with existing core blowers or shooters.

These Manipulators can be incorporated into a number of multi-station Mould and Coremaking Plants.

Further Details From

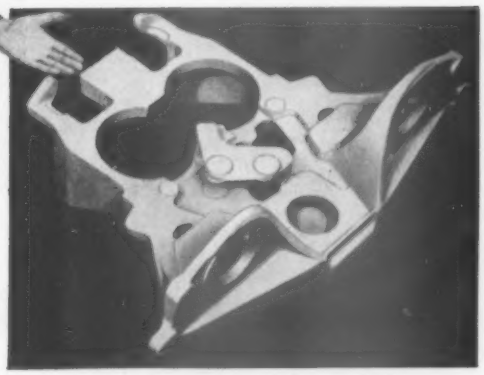
Polygram *Casting Company Limited*

THE FIRST NAME IN SHELL MOULDING

SHERNFOLD PARK, FRANT, TUNBRIDGE WELLS, KENT, ENGLAND.
TEL. FRANT 346

The Only British Specialists in Shell Moulding and Coremaking

That's what I call PRECISION

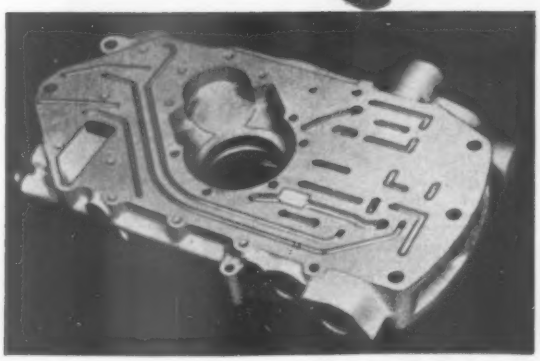


0·100″ wall thickness with pin-point accuracy.

Precision is vital in the casting of high performance electronic equipment. That's why

STERLING METALS LTD.

chose to use a THOR Shell-Moulding resin. (Size of casting: 7½″ long × 10″ at widest point—wall thickness 0·100″)



"as cast" and not machine finished.

Again, precision is the keynote of this automatic transmission part cast by

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. . . again using a THOR Shell-Moulding resin. This casting is 14″ long × 7½″ wide. Slots are in "as cast" condition and not machine finished.

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FOUNDRY RESINS

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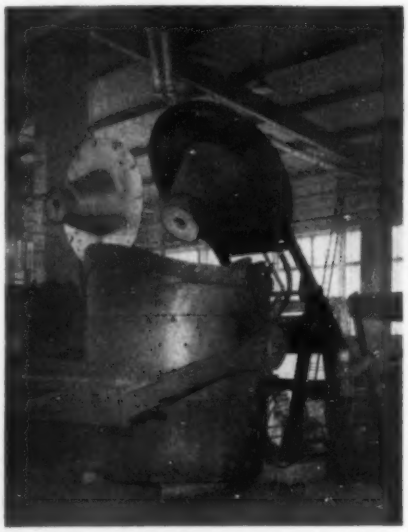
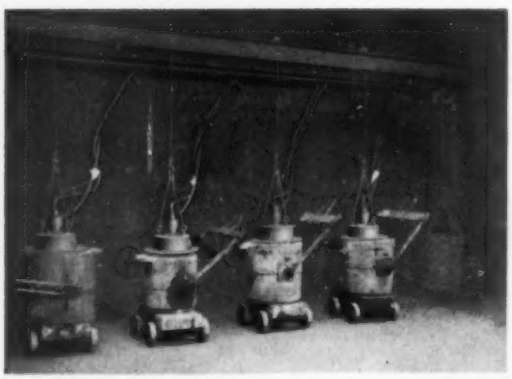


30 ton ladle drying and preheating equipment at the Dowlais Ingot Mould Foundry of Messrs. Guest Keen Iron & Steel Co. Ltd.

Below: Gas fired installation at the Coventry works of Messrs. Sterling Metals Ltd., drying and preheating Bogey Ladles.

'VORTEX' LADLE DRYERS

For ladle drying and preheating, "Vortex" gas or oil fired ladles have proved over the years to be safe and reliable, operating efficiently without smoke fumes or ash. Available in sizes to suit all types of ladle from 5 cwt. capacity upwards. The degree of air and fuel turn-down enables one size of dryer to dry several sizes of ladle. Control valves remote from burner making control easy and comfortable.



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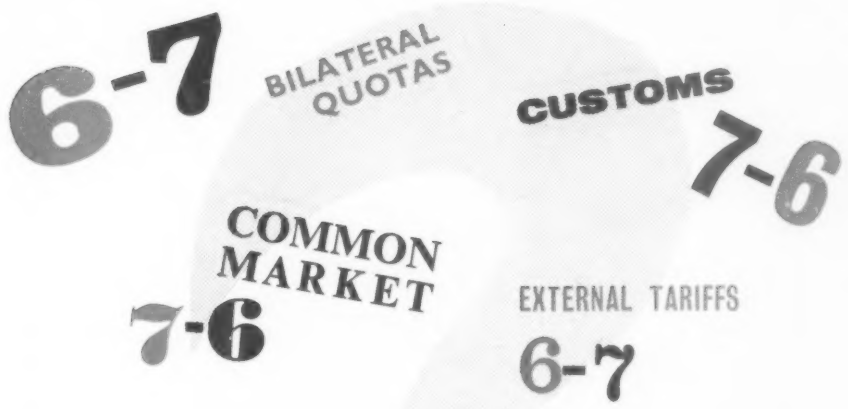
Drew Brown Limited, 5410 Ferrier Street, Montreal, 9, Canada.

OVERSEAS AGENTS:

Fenter (Africa) (Pty), Ltd., P.O. Box 6738, Johannesburg, South Africa.

WHATEVER THE ULTIMATE OUTCOME



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Weigh all the air

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In addition, Foxboro Systems are available for measuring, recording or controlling — Pressure, Humidity, Dewpoint, Temperature and many other variables.

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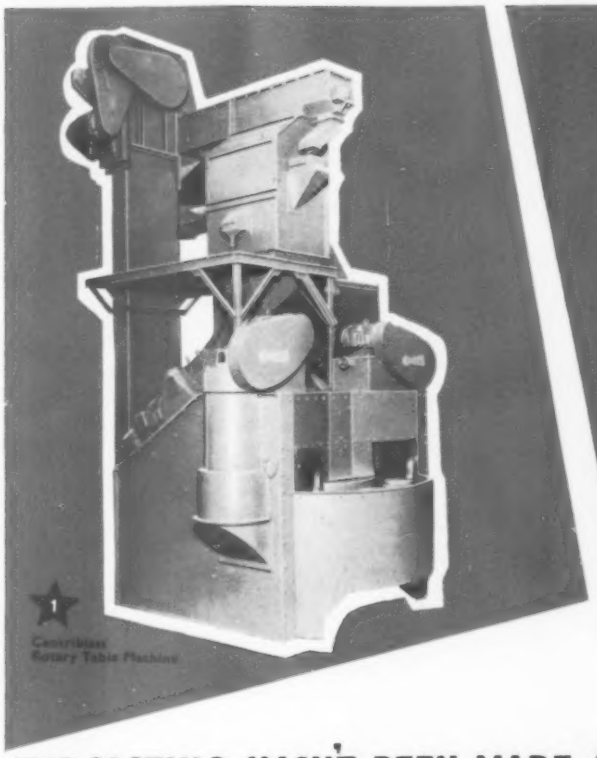

1 Centriblast Rotary Table Machine

2 Centriblast Barrel Machine

THE CASTING HASN'T BEEN MADE

that cannot be cleaned by . . . . . .

CENTRIBLAST

Big castings, small castings, intricate or simple—they all come clean in a Centriblast. Illustrated here are just three of a fully comprehensive range of machines.—

1 for flat delicate castings

2 deal for more robust castings

3 'you name it'

Call in Spencer & Halstead and end your cleaning problems—remember Centriblast cleans fast!

3 Centriblast 180 sq.ft. square Airless Room Plant

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STANTON AND STAVELEY low phosphorus foundry pig iron

This iron is machine cast and customers special requirements can be met within the limits of analysis shown.

It is particularly suitable for the Automobile Industry and for all High Quality Castings.

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	Total Carbon	3·4% min.
	Silicon	2·0—4·5% (in ranges of ·5%)
	Manganese	0·7—1·1%
	Sulphur	0·05% max.
	Phosphorus	0·25% max.

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A free and confidential metallurgical service is offered to customers in all aspects of foundry practice and technique.

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Solve the Problem

This company produces a diversity of castings in alloy iron and hematite iron. These include ingot moulds for the steel industry, brake drums and liners for Public Passenger vehicles, machine tool castings, gear wheel blanks, Colliery castings and General Engineering castings. The problem here was to find a suitable Shot Blast Machine to clean castings from one pound to two tons at lowest total cost and to speed production.

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4 50 per cent. increase in Output is now cleaned by same number of operatives.
5 No Breakages of Thin Castings.
6 Considerable saving of shot.
7 Fettling keeps pace with output.
8 Perfectly clean Castings to customers on time.

Blasting time three minutes

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(IF YOU WANT REALLY EFFICIENT CORE BREAKDOWN)

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Foseco*

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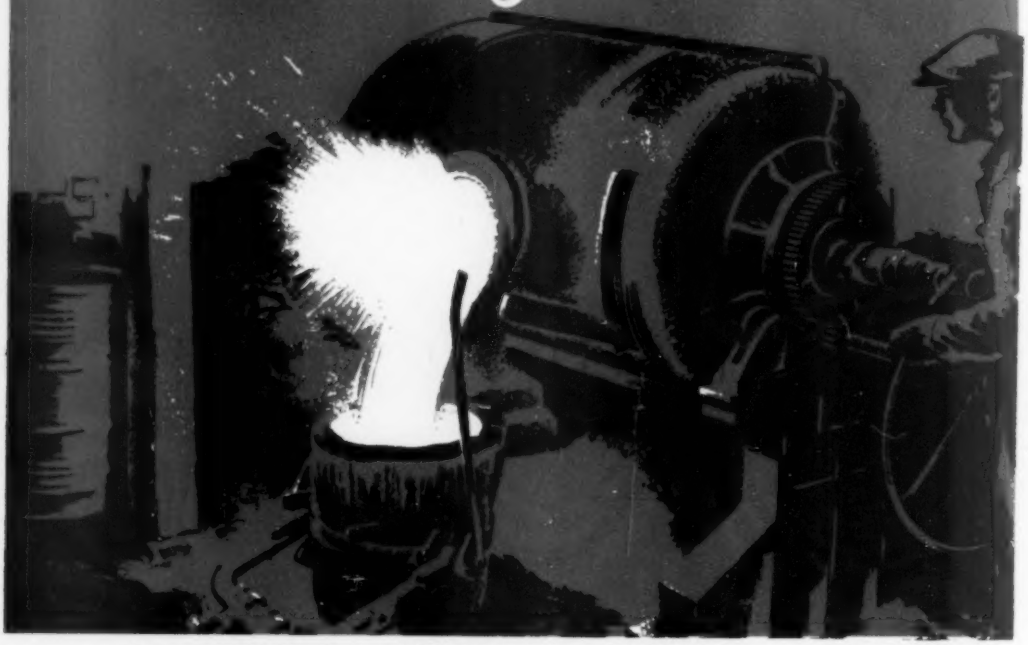

. . . for COMPLETE MONOLITHIC LININGS · MOULDING SPECIAL SHAPES · REPAIRS TO BRICKWORK

	How Supplied	Type of Set	Methods of Use	Refractoriness	Thermal Hardening Temperature	Maximum Temperature of use	Approx. weight required per cubic foot lbs.	Approx. weight required per cubic metre kgs.
Maksiccar Plastic	Plastic	Heat Setting	Hand moulding or patching	1730°C	900°C	1580°C	140	2243
Stein Sillimanite Patch	Plastic				1000°C	1700°C	155	2483
Stein 73 Plastic	Plastic			+1750°C	1000°C	1800°C	180	2884
Maksiccar Fire Putty	Plastic	Air Setting	Hand moulding or patching	1350°C	500°C	1100°C	140	2243
Stein Chrome Patch	Semi-Plastic			+1750°C	600°C	1500°C	200	3204
Maksiccar Patch	Plastic		Ramming or patching	1690°C	600°C	1550°C	135	2162
Stein 73 Patch	Semi-Plastic			+1750°C	600°C	1800°C	175	2804
Stein Magnesite Ramming Mixture	Dry			+1750°C	1400°C	1750°C	175	2804

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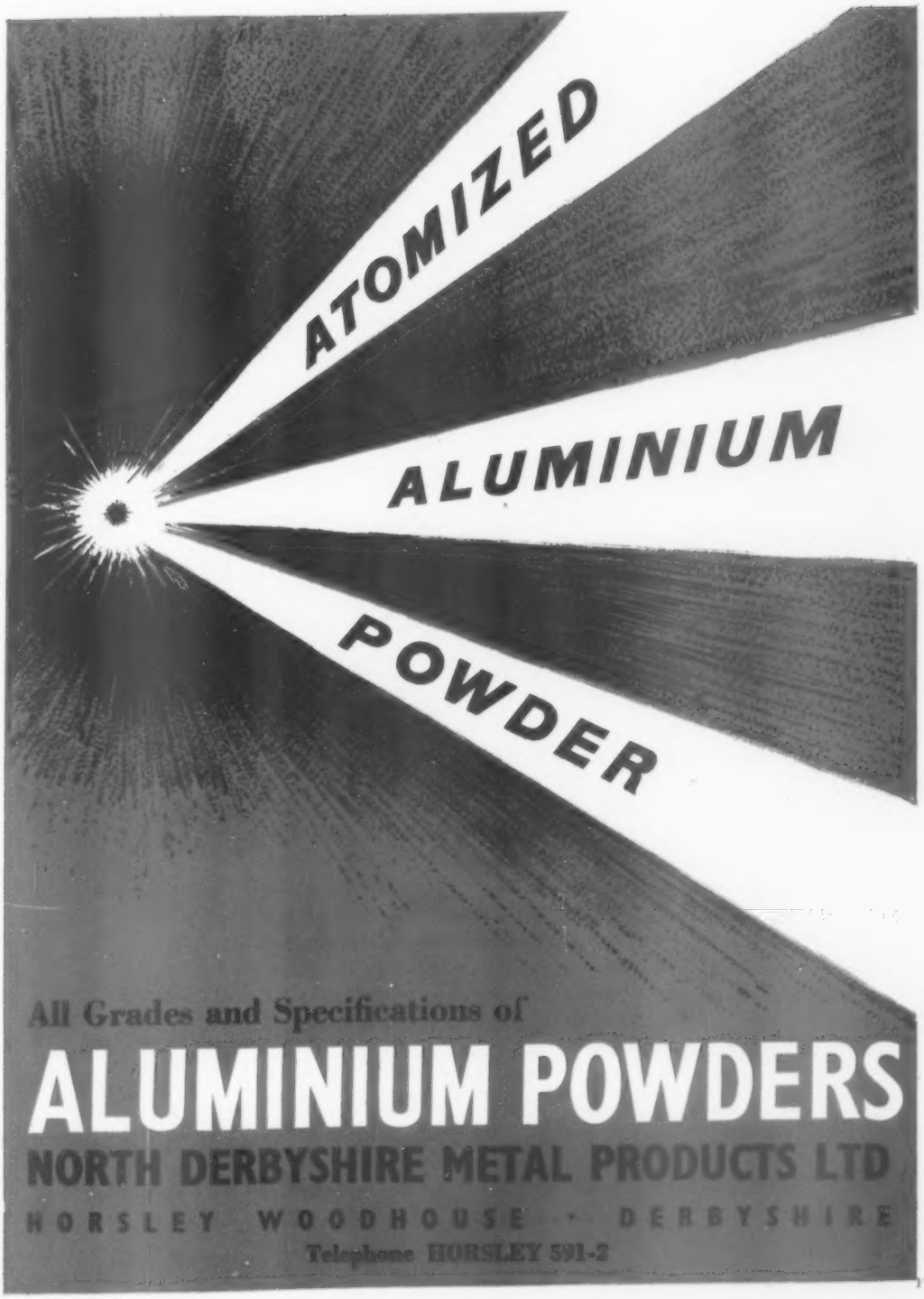
Our technical department are also available to advise on suitability of application and correct ramming procedure.

JOHN G. STEIN & Co. Ltd., Bonnybridge, Scotland. Tel: BANKNOCK 225 (4 lines)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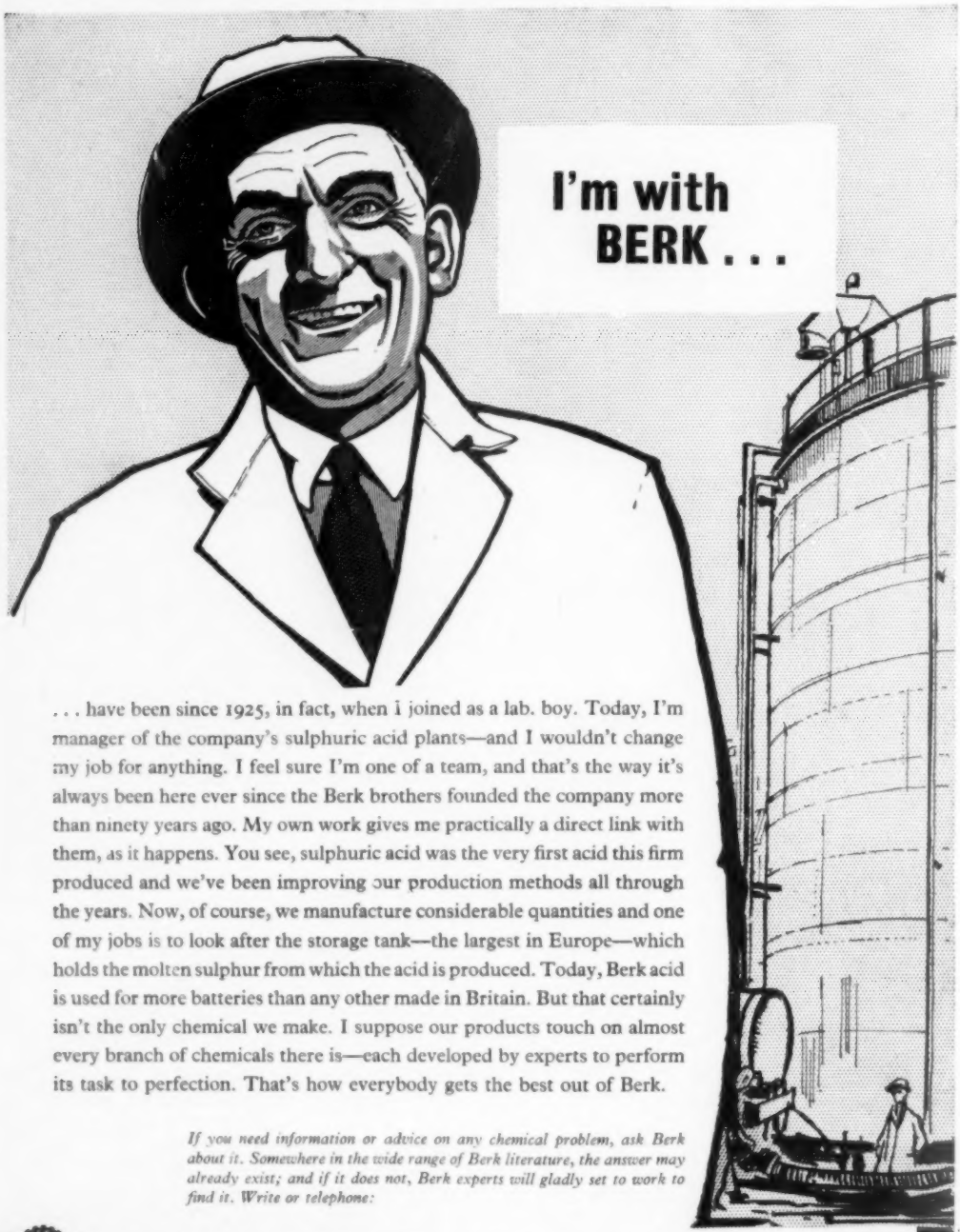

. . . have been since 1925, in fact, when I joined as a lab. boy. Today, I'm manager of the company's sulphuric acid plants—and I wouldn't change my job for anything. I feel sure I'm one of a team, and that's the way it's always been here ever since the Berk brothers founded the company more than ninety years ago. My own work gives me practically a direct link with them, as it happens. You see, sulphuric acid was the very first acid this firm produced and we've been improving our production methods all through the years. Now, of course, we manufacture considerable quantities and one of my jobs is to look after the storage tank—the largest in Europe—which holds the molten sulphur from which the acid is produced. Today, Berk acid is used for more batteries than any other made in Britain. But that certainly isn't the only chemical we make. I suppose our products touch on almost every branch of chemicals there is—each developed by experts to perform its task to perfection. That's how everybody gets the best out of Berk.

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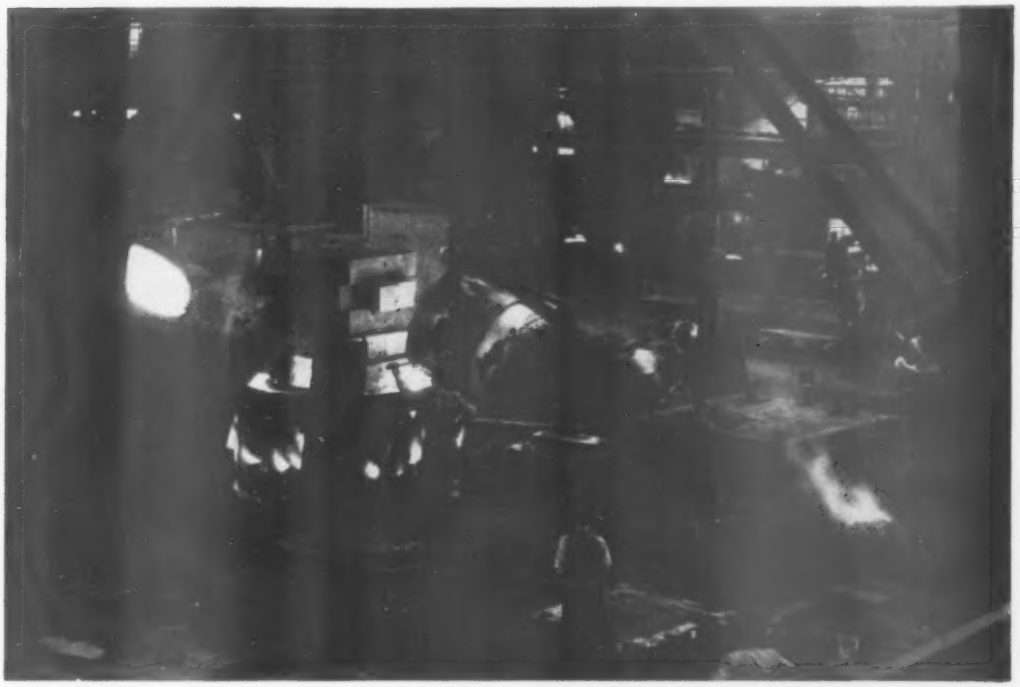

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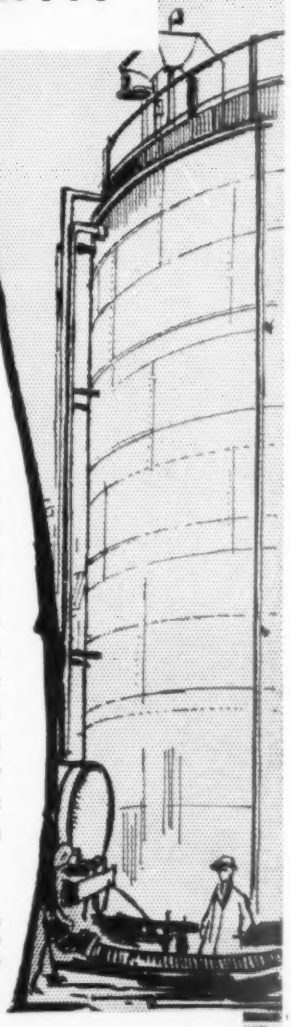

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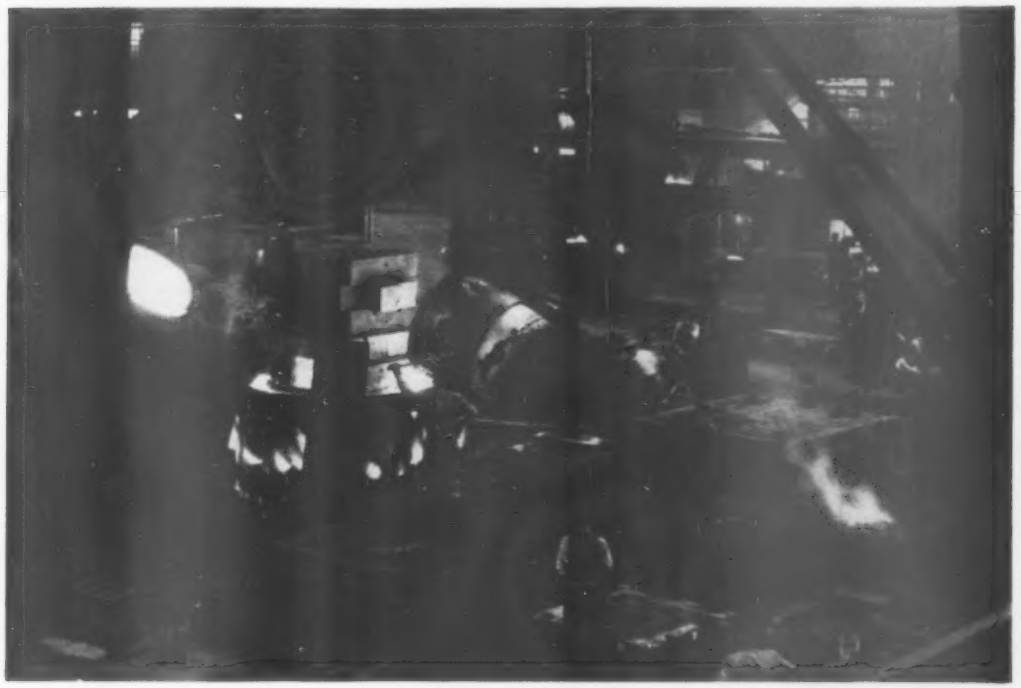

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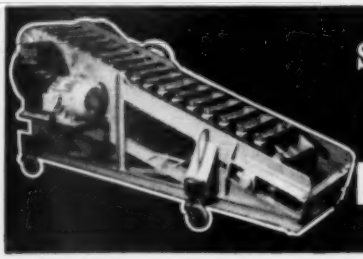

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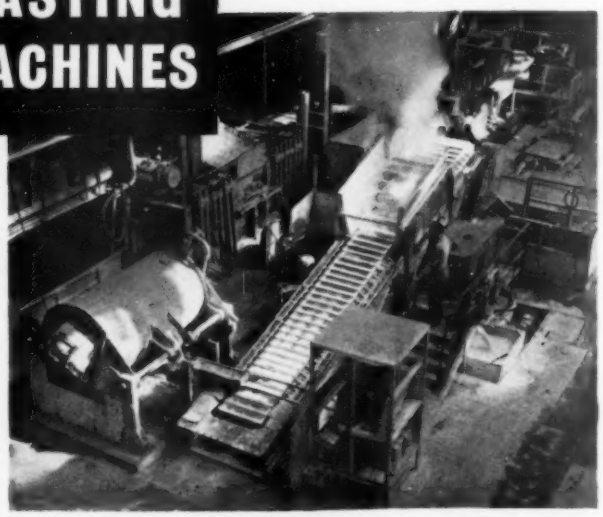

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Technical:

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BRITISH INVESTMENT CASTERS' TECHNICAL ASSOCIATION

Secretary: **E. G. Donaldson, B.Sc.,** 5, East Bank Road, Sheffield, 2 'Phone: Sheffield 28647.

Research Associations:

BRITISH CAST IRON RESEARCH ASSOCIATION

Alvechurch, Birmingham. 'Phone and 'Grams: Redditch 2715-8.
Scottish Laboratories: Blantyre Industrial Estate, Blantyre, Lanarkshire. 'Phone Blantyre 486.

BRITISH STEEL CASTINGS RESEARCH ASSOCIATION

East Bank Road, Sheffield, 2. 'Phone: Sheffield 28647.

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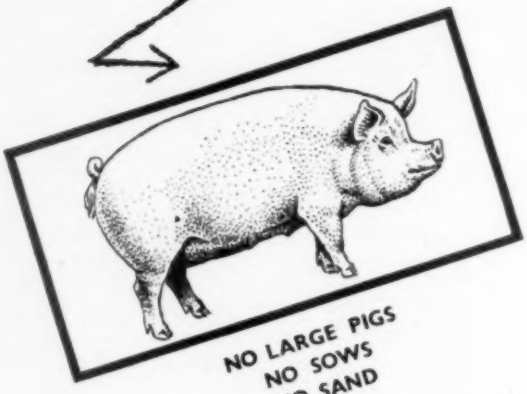

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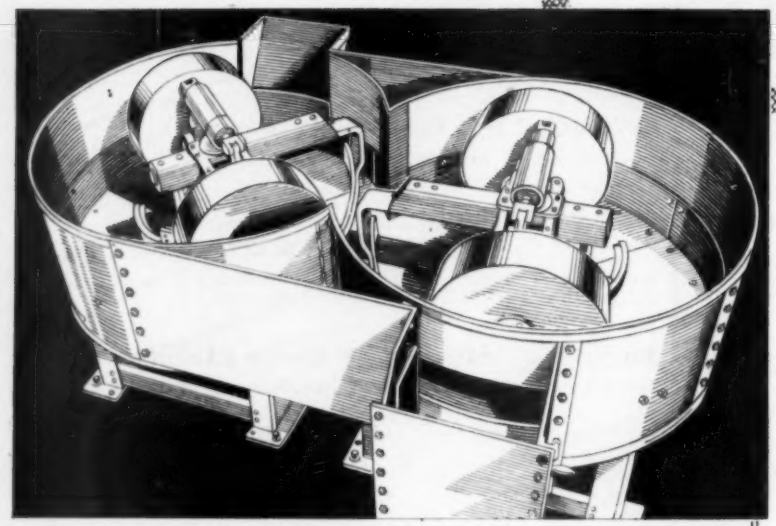

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FOUNDRY
TRADE JOURNAL
Vol. 111 November 9, 1961 No. 2344

Research and Sales

Interesting views were put forward by Dr. Tom Margerison, science editor of the *Sunday Times*, when he addressed the National Conference of the British Institute of Management. One suggestion he made was that every research organization should have either a market-research section or a liaison with a sales organization. Whilst this is commonsense, so is the reverse, namely that sales organizations should collaborate with the research staff. So far as the foundry industry is concerned, no longer are research laboratories operated for their prestige value as was the case about 30 years ago and still obtains in a few industries. At that time some firms' sales literature included meaningless photomicrographs printed on coloured paper, just to blind potential customers with science. Both large and small foundry concerns—and their suppliers also—now utilize the services of a number of technical salesmen who constantly bring to the notice of the research section (or perhaps, more truthfully, the technological department of the concern) the service problems of potential users.

Perhaps we have not grasped sufficiently well just what Dr. Margerison meant by " market research " as such studies do not usually rank in the realms of technical research. We are constantly being consulted by market-research people who ask the usual questions as to outputs and value, area distributions and the like. When such enquiries refer to overseas selling, additional information as to advertising media, costs, freights, imports duties, etc., is requested. If this activity is referred to, we cannot envisage what this has to do with the technological staff. If, however, straight sales-development be implied, then we are wholeheartedly in agreement.

On the other hand, co-operation between the buying, design and quality-control departments is a recognized essential, at least in foundry circles. Dr. Margerison does not discuss these aspects, because obviously he has encountered examples of great waste of time and effort on projects which have no place in the economics of an industry. In a list of researches being undertaken by an overseas research institute there was one included—an investigation into the composition of a proprietary binder—which would certainly have warranted Dr. Margerison's dictum as to the need for a prior commercial investigation. In the British foundry research organizations, it is difficult to imagine a useless project being undertaken, as a committee of industrialists and technologists takes the responsibility for initiating all new projects.

Correspondence

To the Editor of THE FOUNDRY TRADE JOURNAL

A FOUNDRY ENGINEERS' GROUP?

SIR,—To my letter published in the issue of September 28 referring to correspondence from "Enthusiastic Engineer" concerning the formation of an engineers' group of the Institute of British Foundrymen, I hope that we shall soon have the enthusiastic comments of the engineer. However, as there was an editorial note appended to my letter, inviting further correspondence, I venture to write again on the matter.

My suggestions for the formation of such a group are as follow:—

(1) That evidence of interest shall be shown by engineers and others by their writing to the Editor of the JOURNAL (the word "Agree" printed on a sheet of paper giving the senders name and address would suffice). The Editor, I am sure, would give us the "count" of such letters, even if space does not permit the printing of any or all of them.

(2) Subsequent to (1), a meeting should be convened to discuss the matter.

(3) That the Institute of British Foundrymen be approached and the suggestion for the formation of the proposed group be presented to the Institute's Council, together with a full report of the meeting (2).

(4) Subject to the reactions of the Institute's Council, a further meeting should be convened, or notification to interested engineers given in the JOURNAL (subject to agreement of the Editor).

(5) In the event of favourable reactions from the Institute of British Foundrymen, then after (4) no doubt the matter would be placed in the hands of the Institute.

Until these necessary preliminaries are completed I would be willing to act as secretary to the embryo "Engineers' Group." I should add that I have held up my own application for membership of the IBF, until I can see whether the proposed group will form now or wait until such time as such a formation is dictated by events. —Yours, etc.

N. TAYLOR,

64, Hookfield, Tye Green, Harlow, Essex.
October 27, 1961.

To the Editor of THE FOUNDRY TRADE JOURNAL

SIR,—The attention of the Council of the Institute of British Foundrymen has been drawn to the correspondence which has appeared in recent issues of your JOURNAL suggesting that the Institute should form within its membership an "Engineers' Group."

The Council regards this proposal with some sympathy, but it is, of course, a far reaching change in the structure of the Institute which cannot be undertaken lightly. At this stage, therefore, it is thought to be wiser to explore the possibilities of the proposal by requesting the Institute's branches to arrange discussion groups on equipment and other suitable engineering subjects, following which, if successful, the scheme will be extended to include symposia at conferences. If as a result it is shown there is a clear need for the proposed "Engineers' Group," the Council would be prepared to take appropriate action. In accordance with the views outlined above the Council is taking steps to initiate the discussion groups in branch areas.—Yours, etc.

G. LAMBERT,
Secretary.

Institute of British Foundrymen,
14, Pall Mall, London, S.W.1.

Forthcoming Events

NOVEMBER 13

Institution of Production Engineers

Halifax and Huddersfield section:—"Design and Development of Machine-tools," by C. A. Sparkes, 7.30 p.m., at the Percival Whitley College of Further Education, Francis Street, Halifax.

NOVEMBER 14

West of England Metallurgical Society

Discussion on "Teaching Metallurgy to Metallurgists and Engineers," opened by Prof. J. G. Ball and L. W. Derry, 7 p.m., at the College of Science and Technology, Ashley Down, Bristol 7.

Institute of British Foundrymen

Coventry section:—"Mechanized Foundry for the Weekly Production of 250 Tons of Blackheart-malleable Castings," by G. Lamb, 7.30 p.m., in the Lecture Theatre, Herbert Art Gallery and Museum.

Institution of Mechanical Engineers

Automobile division:—"Automobile Air-cooled Engines," by Julius Mackerle, 6 p.m., at 1, Birdcage Walk, Westminster, London, S.W.1.

NOVEMBER 15

Institution of Production Engineers

Birmingham section:—"Aspects of Design and Machine-tools and Automation Equipment for the Future," by F. A. Lewis, 7 p.m., at the James Watt Memorial Institute, Birmingham.

Peterborough section:—"Surface Finish," by R. E. Reason, 7.30 p.m., at F. Perkins, Limited, Conference Room, Peterscourt, Peterborough.

Institution of Plant Engineers

East Midlands branch:—"Coal Utilization," by D. Hicks, 7 p.m., in the Sherwood Room, County Hotel, Theatre Square, Nottingham.

NOVEMBER 17

Institute of British Foundrymen

Bristol branch:—"Elimination of Gases from Cast Metals," by D. V. Atterton, 7.30 p.m., at the Royal Hotel.

NOVEMBER 18

Institute of British Foundrymen

West Wales section:—"Greensand Moulding," by H. Haynes, 6 p.m., at the Wales Gas Showrooms, The Kingsway, Swansea.

West Riding of Yorkshire branch:—"Gating for Production of High-duty Iron Castings," by L. Clarke, 6.30 p.m., at the Bradford Institute of Technology. (Meeting originally arranged for November 4.)

Presentation to Mr. Cyril M. Cohen

Last month, at the Wood Lane headquarters of the George Cohen 600 Group, Limited, the chairman and managing director, Mr. Cyril M. Cohen, was presented by the group's employees with a silver and enamel—gold monogrammed—cigarette-box to mark his 45 years of service. The presentation was made by Mr. D. W. Cooper, a director of George Cohen Sons & Company, Limited, in the presence of some 60 people—who had balloted for the privilege—directors, executives and workpeople representing the group's 36 companies at home and overseas. With the cigarette-box was a commemorative volume containing the names of the 1,400 subscribers and also a cheque which will be sent to a charity personally selected by the chairman.

Mr. Cohen, on receiving the gifts, said that his years with the group had passed very quickly. He recalled some of his early memories with George Cohen's in London and South Wales before the advent of the machinery division, and when the activities of the company were mainly associated with the scrap industry. "I have always given of my best—but nothing could have been achieved without the wholehearted support of the staff and workpeople," he said.

British Cast Iron Research Association

Report of Progress during the Year ending June 30, 1961

The year's developments include reorganization of the Association's committee structure, completion of a cupola melting investigation, and initiation of a study on factors governing dimensional stability of greensand moulds. Other research work reported includes that on soundness of castings, moulding materials, processing of castings and casting properties. The Report also covers, the election of officers, finance and progress of the Advisory Service.

The annual general meeting of the British Cast Iron Research Association was held on November 8 at the Connaught Rooms, London, when the following Report covering the year's activities to June 30 was presented:—

At the fortieth annual general meeting of the Association, held in London on November 1, 1960, Mr. Richard Miles, B.SC., M.I.MECH.E., was elected president of the Association in succession to Mr. C. R. Wheeler, C.B.E., Dr. L. B. Pfeil, O.B.E., F.R.S., Mr. G. R. Shotton, F.I.M., and Mr. G. S. Steven were elected vice-presidents.

General

During the year the Council, under the chairmanship of Mr. H. J. V. Williams, held six meetings, and there were 11 meetings of the advisory committee to Council. Mr. M. M. Hallett, M.SC., F.I.M., was re-elected vice-chairman of Council and Mr. S. H. Russell, O.B.E., C.G.I.A., was re-elected honorary treasurer for 1961. There were, in addition, 20 meetings of the main committees of Council and 16 meetings of the technical sub-committees of these, making a total of 53 meetings during the year.

During 1961 the Council reviewed in detail the working of its committees and sub-committees and revised the whole committee structure. This came into operation from May, 1961. As a result of these changes there are now four main committees of Council as follow:—

Membership Services Committee—responsible to Council for reviewing the confidential advisory services which the Association provides. (Chairman, Mr. G. R. Buckley.) *Investigations Board*—responsible for reviewing all the Association's experimental work. (Chairman, Mr. P. A. Russell.) *Information Committee*—which supervises the Association's library, publications, conferences, lecture courses and participation in exhibitions. (Chairman, Mr. R. L. Handley), *Scottish Committee*—which reviews the activities of the Scottish Laboratories at Blantyre, and acts to represent the special needs of the Scottish section of the industry and to promote interest in the Association's activities among Scottish members. (Chairman, Mr. R. R. Taylor.)

The former foundry atmospheres committee has now become a sub-committee of the Investigations Board, and the former foundry operations committee has become a sub-committee of the membership services committee.

The Investigations Board has completely revised its technical sub-committee structure and the membership of each has been reconstituted. The current sub-committees of the Investigations Board are as follow:—

Mechanical and physical properties sub-committee (chairman, Mr. F. Buckley); foundry plant and equipment sub-committee (chairman, Mr. P. A. Russell); soundness of iron castings sub-committee (chairman, Mr. J. W. Dews); alloyed cast iron sub-committee (chairman, Mr. S. Illingworth); moulding methods and materials sub-committee (chairman, Dr. D. V. Atterton); methods of analysis sub-committee (chairman, Mr. S. W. Craven); foundry atmospheres sub-committee (chairman, Mr. W. Brindley); fuels and furnaces sub-committee (chairman, Mr. L. W. Bolton); malleable castings sub-committee (chairman, Mr. H. G. Hall), and white- and chilled-iron castings sub-committee (chairman, Mr. K. H. Wright). The chairmen of these sub-committees meet the Investigations Board in the investigations committee.

All sub-committees of the Investigations Board and of the membership services committee are to be dissolved after three years and re-appointed as necessary. The dissolution will take place on a rota basis, so that some sub-committees will be considered in this way each year.

These changes and the nomenclature used are intended to reflect the fact that the activities of the Association broadly speaking fall into three categories:

(*a*) The carrying out of experimental work in the Association's laboratories and in co-operation with members as part of a general experimental programme. Some of this experimental work may be of a research character and some of a development character. This is the responsibility of the Investigations Board.

(*b*) The provision of a confidential advisory service to members and to users of iron castings. This is the responsibility of the membership services committee.

(*c*) The dissemination of information arising from experimental work, co-operative activities and experience in dealing with members' problems. This is the responsibility of the information committee.

Corresponding with these changes in the Association's committee structure, the technical staff of the Association are now organized into an investigations department, primarily responsible for carrying out

Sampling cast iron to produce a cooling curve. With rapid thermal analysis carried out in this way it is possible to check the Carbon Equivalent value on melts in progress.

experimental work, and a member services department, responsible for providing the confidential advisory service to members. The activities of the staff are not, however, limited by this organization; members of the investigations department are used as is appropriate to deal with members' problems, and the staff of the member services department are encouraged to carry out experimental work to some extent.

During the year the Council suffered a severe loss by the death of Mr. E. Freer, whose services to the Association had been considerable, and the resignation of Mr. W. Barnes. The Council of Iron-foundry Associations nominated its chairman, Mr. M. J. Glenny, to the vacancy, and other new members appointed during the year were Mr. C. M. G. Wallwork, Mr. George R. Webster and Mr. C. H. Wilson.

Finance

The income and expenditure account for the year ended June 30, 1961, and the balance sheet as at June 30, 1961, accompanied the report. Income at £255,473 is £9,747 greater than for the preceding year and is a new record for the Association. Grant-earning income amounted to £160,263, enabling the Association to claim Government grant amounting to £68,900. If further industrial income of £6,737 had been received, the full Government grant of £74,000 could have been claimed. The Association is again indebted to the Joint Iron Council for subscribing a major part of the grant-earning income, this year the contribution from the pig-iron levy fund being £118,000. Income for ordinary " B " members has shown a useful increase from £30,580 in 1959-60 to £39,323 for the year under review. The number of grade " B " members continues to grow and now stands at 466.

Revenue expenditure has risen from the previous year's figure of £201,048 to £222,457. The excess of income over expenditure for the year is £33,016, of which an amount of £30,000 has been transferred to the buildings and equipment fund, the balance of £3,016 being added to the general fund. The balance sheet shows that the net value of fixed assets now stands at £231,684 and current assets at £208,287 show an excess over current liabilities of £194,276. The buildings and equipment fund now amounts to £325,000 and the general fund to £100,360. Capital expenditure during the year amounted to £42,393, mainly in connection with the new laboratory block and outstanding commitments for capital items at June 30, 1961, were £42,408.

The financial position of the Association for the year may be regarded as satisfactory since the excess of income over revenue expenditure almost equalled the amount spent on capital account and the surplus of current assets over current liabilities at June 30, 1961, covered approximately 10 months' revenue expenditure. The main part of the Association's industrial income continues to be derived from the pig-iron levy fund and in view of the uncertainty regarding pig-iron usage over the next few months, coupled with the need to widen the scope of the Association's work and the necessity for additional accommodation, the liquid funds are not considered to be excessive.

Miscellanea

In January, 1961, Professor A. J. Murphy, M.SC., F.I.M., retired as a DSIR official visitor, and his place was taken by Professor A. G. Quarrell, D.SC., PH.D., F.I.M., Mr. E. W. Colbeck, M.A., F.I.M., and Professor Quarrell visited Bordesley Hall during the year to inspect the Association's work.

Reference was made in the last annual report to the commencement of work on the erection of a new laboratory block. It is hoped that this building will be completed by December, 1961, enabling all laboratory work to be moved out of the main hall and thereby partially to relieve the present overcrowding.

The Council was delighted to learn of the award of the M.B.E. in the New Year Honours List to Miss J. Brenner, who has been on the Association's staff since 1928.

Investigations Department

The work of the investigations department is now supervised by the newly-formed Investigations Board

and investigations committee, which maintain close contact with the programme through the following sub-committees:—Fuels and furnaces sub-committee; malleable castings sub-committee; moulding methods and materials sub-committee; white and chilled iron castings sub-committee; methods of analysis sub-committee; soundness of iron castings sub-committee; mechanical and physical properties sub-committee; alloyed cast irons sub-committee; foundry atmospheres sub-committee, and foundry plant and equipment sub-committee.

Cupola Melting

A programme of investigations has been completed using the experimental cupola with a parallel melting zone and an acid lining. Following an initial study of the influence of cold-blast volume and tuyere dimensions on the melting rate, metal temperature, metal composition, combustion ratio, top gas analysis and temperature, and lining wear, a comparison has been made of the operating characteristics using both hot- and cold-blast. Coke charges between 10.4 and 16.4 per cent. of the metal charge and hot blast temperatures of 520 deg. C. were involved and the results have indicated the effect of hot-blast on composition and metal temperature and they have enabled an economic appraisal of the use of hot-blast to be made. At the same time, the advantages of injecting 2 per cent. oxygen into the cupola well, or alternatively into the cupola blast, have been evaluated for cold-blast operation and the former process has been found to offer distinct advantages.

It has been shown that graphite powder can be injected through the tuyeres of the cupola to produce an important increase in carbon content of the metal thereby making the melting process more flexible for the production of different grades of iron. Foundry-scale trials have been carried out. Experiments with injection of oil through the tuyeres have also been undertaken. A process for continuous desulphurization of cupola metal has been developed involving dispensation of soda-ash onto the metal stream and slag separation in a forehearth.

In conjunction with the British Coke Research Association, the effect of coke size has been determined for two types of coke and the decrease in efficiency when using small-size coke was evaluated. A simple technique of thermal analysis has been developed whereby the Carbon Equivalent content of cupola irons can be determined before the metal is poured into the castings and guidance has been provided for the installation of this control process in a number of foundries.

Soundness of Castings

The influence of inoculation in promoting shrinkage porosity in grey cast iron has been shown to be due to its effect in increasing casting dimensions and hence has been related with the general problem of dimensional stability of the mould. The state of inoculation of grey iron, expressed as the degree of nucleation, has been compared for various commercial melting furnaces, to elucidate the reasons for variable metal quality.

The soundness of test castings has been evaluated for all metal produced from the experimental cupola and it has been shown that for constant-charge type the principal variations to be expected from variations in operating conditions are related to composition. Varying-charge type has produced variations in degree of nucleation and consequent variations in shrinkage.

It has been shown that a bismuth-containing mould wash may be used to improve local soundness in the same way as a tellurium-containing mould wash. Both types of mould wash may have undesirable side effects on casting structure and properties but bismuth-containing mould washes have the advantage of being less unpleasant to handle. Further work has been carried out on the formation of blowhole defects associated with manganese sulphide segregation and slag inclusions, and it has now been possible to advance a full hypothesis describing the mechanism of their formation.

Moulding Materials

A study has been commenced of the factors governing dimensional stability of greensand moulds. Work has already been published on the influence of many additions to greensand which has shown pitch to be a particularly useful addition to improve stability. The work is being extended to moulds made under high pressure and to the development of suitable sands for this process.

The curing properties of a wide variety of binders for the hot-box process have been investigated and the optimum curing conditions recorded. Experiments have shown that different sands have different casting characteristics and this aspect is being investigated. In particular, the tendency for hydrogen pick-up and pinholing defects to occur in these and in shell-moulding materials is being studied. A similar investigation has been commenced on materials for the cold-box process which has recently been developed.

The apparatus for rapid heating of sand samples and evaluation of stress/strain properties at liquid metal temperatures has been completed and has been used for demonstrating the much poorer high-temperature properties of underbaked oil-sand cores. A technique has been devised for the continuous measurement of moisture in foundry sand, having greatly improved reliability. An automatic apparatus is under construction.

Enamelling Cast Iron

It has been shown that defects in the enamel coating may result from the presence of coarse particles of graphite, from unbalanced sulphur contents, and from inefficient shotblasting. The influence of inoculation and of annealing before enamelling have been related with these effects. This work is to be published shortly by the Association.

White and Chilled Cast Iron

Comparative quantitative studies have been made of the effects of chromium, silicon and carbon on chill and mottle formation. In particular the relative effects of silicon added in the charge or as an inoculant have been studied. The relative effects

Memomotion photography forms a useful work-study tool for use by the Association's Foundry Operation Section.

of superheating time and temperature have been demonstrated in irons of different composition and the conditions for minimum mottle spread for a given chill depth have been tentatively suggested.

The combined effects of titanium and nitrogen in refining the grain-size of chromium irons have been studied with particular reference to the microstructure of the matrix and the mechanical properties of the irons. Long-term heat-treatments have also been pursued so that the conditions for the formation of sigma phase in 30 per cent. chromium irons may be determined. The occurrence of this phase has now been confirmed in a number of irons.

Hot-tearing defects in white irons have been studied in a variety of test castings and the effects of baking efficiency of cores, of mould hardness and of stripping time have been determined. Experiments have suggested that the stress/strain characteristics of cores are an important property. This investigation covers both laboratory and commercially-made castings.

Mechanical Properties of Cast Irons

A programme of creep- and growth-testing continues, to obtain data to permit raising the maximum service temperature of iron castings in steam engineering applications. Following high sensitivity creep testing at 350 deg. C., tests have now been completed at 400 deg. C. with very encouraging results, and tests are being extended to cover the influence of section size. Further equipment to provide stress/rupture data will shortly be installed. The investigation of the characteristic stress/strain properties of grey cast iron has continued, with particular reference to the shape and quantity of the graphite and to section size. This has enabled further explanation of the characteristic stress/strain curve of cast iron to be made. The mechanical properties of nodular irons after a variety of heat-treatments are being investigated with particular reference to proof-stress value, which has been shown to be greatly improved after hardening and tempering.

Malleable Cast Irons

Much of the work for the malleable-iron industry has been directed towards the hot-tearing investigation and the studies have involved both blackheart and whiteheart compositions. It has been shown that zinc does not adversely affect the annealability of malleable irons even when present in quantities far greater than those normally arising in practice. It has also been shown that the retarding effect on annealability of chromium cannot satisfactorily be offset by antimony additions, as had been originally hoped, but that there may be some advantage in adding antimony for the production of pearlitic-malleable iron.

Tests have been carried out to develop optimum impact properties of blackheart-malleable iron. Increasing the graphite content has been shown to lower the maximum impact value in the ductile condition. It has been shown that structures containing fully-spheroidized pearlite may be ductile at room temperature.

Corrosion

In collaboration with the British Shipbuilding Research Association, periodic checks are being continued of cast-iron propellers cathodically protected and studies have continued on other means of protecting propellers against corrosion. A variety of recently-introduced antifreeze formulæ based on glycol with inhibitors have been evaluated and some results will be published shortly. The principal work of the corrosion investigators continues to be largely advisory and a considerable number of problems involving corrosion and its prevention have been dealt with on behalf of founders and users of iron castings, frequently necessitating examinations in the field.

Nodular Irons

Work has been carried out and published showing the effects of tin in nodular irons. Beneficial effects include an improvement in the proof stress in normalized irons, and an improvement in graphite-nodule shape. Additional studies have been made of the optimum composition to promote soundness in nodular iron, and further work has been carried out in conjunction with foundries to determine the conditions for reducing dross and pinhole defects.

Ingot Moulds

In collaboration with the British Iron and Steel Research Association, a general investigation of the factors determining the lives of steelworks ingot-moulds and bottom-plates has continued and at the same time a number of minor problems have been dealt with. An investigation is in progress on the problem of corner shelling in ingot-moulds and the defect has been studied in all the major foundries involved. Some important information has been obtained on the nature of this defect. In co-operation with a steelworks an investigation has been initiated on the service temperatures experienced by ingot-moulds during the casting of steel.

Analytical Research

Co-operative work has continued under the methods of analysis sub-committee to provide data for Part II of the handbook of *Selected Methods of Analysis of Foundry Materials* which will be concerned with alloyed irons and ferro-alloys. In particular, attention has been given to the determination of phosphorus in such alloys. Methods for the determination of trace elements have been improved and proposed new methods for a number of major elements, including sulphur and silicon, have been evaluated.

New methods which have been published include the determination of fluorine in slags and a technique for recovering chloroform after solvent extraction analysis. Attention is now being paid to the reproducibility of chemical analysis between different laboratories and within laboratories. Spectrographic analysis of cupola slags for appropriate constituents has been developed to routine stage and modifications are being made to existing equipment to provide direct reading of results.

Foundry Atmospheres

Work on foundry atmospheres has been concerned principally with the measurement of airborne-dust concentrations in "general" and "local" atmospheres of different types of iron-foundry. Considerable attention has been paid to the variation of respirable quartz concentration at different work stations in these foundries. The procedure used by the Association for determining the quartz content of respirable ironfoundry dust was described in the *BCIRA Journal* for January, 1961. During the year more than 500 samples of foundry dust have been analysed for quartz.

Fifteen foundries carrying out their own dust surveys have been given assistance in the planning and interpretation of the survey and, where necessary, in the ananlysis of the dust samples collected. A detailed examination has been made of the performance of a commercial ventilated fettling bench used under normal production conditions. This work has confirmed that the velocity and direction of the exhaust air from certain pneumatic fettling tools may make it impracticable to achieve adequate dust control simply by using a ventilated fettling bench. Some progress has been made in the construction of an apparatus for the size analysis of small quantities of dust by centrifugal sedimentation.

Member Advisory Services

The Member Services Department of the Association is responsible for maintaining a confidential advisory service to all members and to users of iron castings. This section of the Association's staff is organized primarily for this purpose, although the Foundry Atmospheres Section also provides an advisory service on matters concerning foundry ventilation, dust control and atmosphere pollution; the Foundry Operations Section provides a service to members on all matters concerning working efficiency, productivity and plant layout; the Scottish Laboratories provide a service for Scottish members and members in Northern Ireland. A substantial proportion of the activities of the investigations department is also deployed from time to time in support of this activity. Altogether this confidential service accounts for some 50 per cent. of the Association's running expenditure.

The increasing importance attached by the Council to the advisory section of the Association's activities has led to a substantial increase in staff allocated to this service. Four additional industrially-experienced members of staff were appointed to deal with enquiries covering general foundry work, cupola operation, shell moulding and malleable cast iron. The increased strength of this department and the increased effort in this field by the other sections of the Association have made possible much more detailed treatment of members' problems. This is reflected in the amount of time spent in members' foundries by staff from all sections of the Association. During the year the total number of enquiries dealt with amounted to 2,417, and 1,226 visits were made to members' foundries and to users of iron castings. An attempt was made to visit the foundries of all grade B members, even though no request for assistance had been received.

As in previous years, a large number of enquiries received from members concerned defects and the problems involved in reducing the percentage of scrap. Recent work of the Association on factors affecting the soundness of iron castings, particularly that indicating that sounder castings can be produced by the use of more rigid moulds, has been useful in dealing with many members' problems, and the recommendations have been widely appreciated. The Association's recommendations on problems related to soundness have undoubtedly been more successful than in previous years.

The shell-moulding process is now firmly established as an important tool in the industry and has provided a number of interesting problems. Problems submitted reflect the increasing use and wide interest in the CO_2 Process, hot-box core-making, and the use of established and new resin binders.

Difficulties relating to knock-out and burning-on are frequent causes of enquiry. It is apparent that the surface finish of castings is assuming greater importance and this subject has taken up much time of the staff. Users of iron castings, and also founders, show increasing concern about the

Coreboxes and cores for operating the hot-box coremaking process and test casting produced from one of the cores.

machinability of iron castings and the Association has frequently during the last year been called in to consider machining difficulties and been able to give advice enabling the difficulties to be overcome.

The experience of the Member Services Department indicates the industry's need for an unbiased confidential service to users of iron castings, this service being backed by experimental facilities. The Association's advice on engineering applications and problems continues to be sought and co-operative work with users of iron castings has begun in several different fields. A good example of this type of work was illustrated in the recently published paper dealing with cracking in diesel cylinder heads; work in this field is still continuing.

Another example of the Assocation's collaboration with users of cast iron is the advice given and subsequent experimental work which is being carried out to investigate the use of cast iron for rollers in bridge construction. Other investigations in this category have involved studies undertaken at members' request to obtain information on the distribution of stress in hydraulically-stressed components, and the effect of vanadium in improving the wear resistance of diesel cylinders.

In addition to the confidential advisory service, considerable time has been spent on the problems emerging as a result of the development of new British and international standards for grey, nodular and malleable cast-irons, and considerable effort has been spent in compiling data for submission to the British Standards Institution in an endeavour to raise the permissible temperature at which cast irons can be used in steam engineering applications. Other co-operative work has included that with the British Coking Industry Association on the breakdown of coke transported by road.

In January, Mr. S. W. Palmer was appointed superintendent of the Member Services Department with Mr. F. Dunn as assistant superintendent. The Member Services Department supersedes the former Development Department. This department maintains a group of people who are instantly available to deal with members' problems. However, the Association calls on the services of all staff where special experience exists which may be of value in solving a particular problem. A comprehensive system has been installed to provide for the progressing of all work concerned with member's problems and to enable the rapid and co-ordinated deployment of the resources available.

Foundry Atmospheres Section

During the past year 176 enquiries from iron-foundries regarding internal and external atmospheric pollution problems have been received. At the request of the members concerned, 112 visits were made to foundries to give advice on site. A further 20 visits to Alvechurch were made by members who were concerned with pollution problems, and who were given advice and assistance in accordance with their very varied problems. The enquiries received by this section have been approximately 55 per cent. concerned with external, and 45 per cent. with internal pollution.

The introduction of the Clean Air Act has brought many external pollution problems to the industry and, in particular, that of cupola emissions. A working party, on which the Association is represented, has been set up to assess on site the results obtained from hot-blast cupola plants built in accordance with the provisional "best practicable means." Cold-blast cupolas continue to provide pollution problems with particular reference to site conditions.

Because of the very varied types and sizes of castings produced by the industry, the fettling and dressing areas in foundries continue to be the focus of particular attention to provide assistance to member-firms in meeting the requirements of the Foundries Regulations. The staff have also been consulted on the problem of dust control during the cutting of refractories for furnace building. The experience gained on foundry grinding and cutting-off machines proved directly applicable to this operation.

Foundry Operations Section

During the year the staff of the Foundry Operations Section has dealt with 65 enquiries, 57 of which have involved visits to members' foundries to give advice on methods of production and foundry layout. These visits, which have been made at the request of the foundries concerned, have dealt with a wide variety of problems. Each visit has been supplemented by a report and where necessary diagrammatic sketches embodying sug-

gestions of layout based on analysis of the results obtained have also been provided.

The section has continued with its general pattern of working, namely that of providing an advisory service on matters connected with productivity and working efficiency. However, during the year there has been an increasing tendency for the requests to be concerned with specific aspects of production. In consequence the section has in many instances had to make a more detailed examination than was formerly necessary. The application of method-study technique, initiated some 18 months ago, has proved invaluable in this respect.

During the year the industry appears to have been particularly interested in major capital projects and the section has been called on to assist in the development, not only of mechanized schemes, but also with the overall layout of new foundries.

Interest in the use of method-study has continued and members have expressed their appreciation of its value. A number of lectures on the application of both memomotion and work sampling have been presented to outside bodies during the year and its value to the section itself is also becoming apparent, in that information obtained by particular studies can be " fed back " to problems of a more general character.

Scottish Laboratories

The Scottish Laboratories as the section responsible for prosecuting the advisory work of the Member Service Department in Scotland, and to a limited extent in Northern Ireland, dealt with a total of 828 enquiries during the year reviewed of which 320 were major foundry problems. A strengthening of staff available for outside work has permitted many of the problems to be dealt with more extensively and the resources and staff of the Alvechurch laboratories were freely drawn on for special assistance when required. Additional melting equipment installed during the year has enhanced the facilities of the laboratories' small experimental foundry and improved physical testing equipment is planned for the immediate future.

The Association's new committee structure retains the Scottish committee as a main technical committee directly responsible to the Council, with the added charge, to its original responsibility of reviewing the work of the Scottish Laboratories, of considering the whole of the work of the Association and recommending to the Investigation Board the promotion of work of particular interest to the Scottish section of the industry.

In view of its wider responsibilities the committee was recently reconstituted to become more fully representative of the industry in Scotland, and under the chairmanship of Mr. R. R. Taylor, arrangements have been made for better dissemination of results of the Association's work within the Scottish industry. During the year reviewed two open meetings have been held at which recent work on the problem of shrinkage and porosity and a review of the work carried out on the BCIRA, experimental cupola has been presented and discussed. Further meetings of this kind are planned to be held at frequent intervals.

Information Department

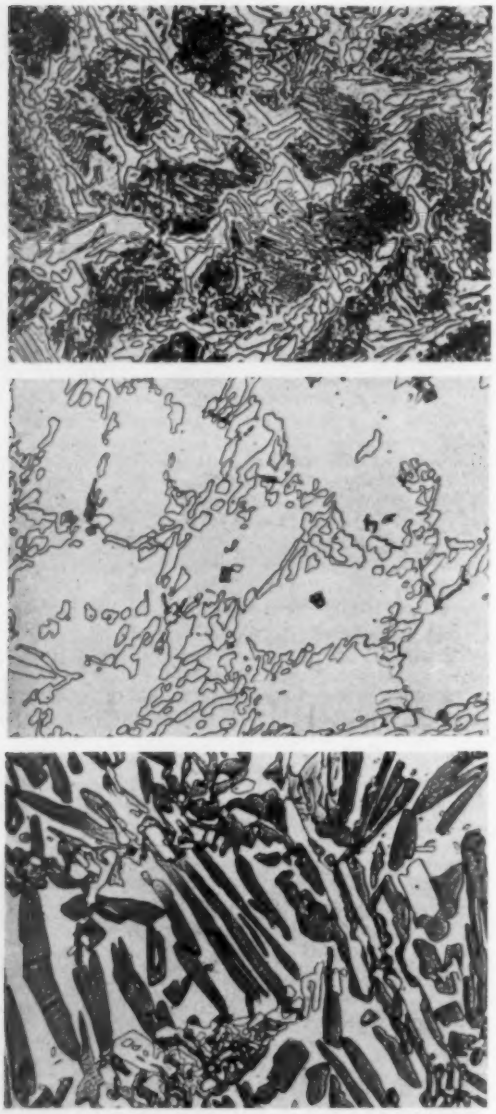
During the year 381 enquiries were answered by the information department—by far the largest number of requests being for identification and requirements of specifications. Information on suppliers was frequently sought and in several cases assistance was given to members on subjects outside the field of ironfounding.

Publications

Circulation of the *BCIRA Journal* has appreciably increased during the year both within member-firms and in subscriptions from non-members. In June the Association, with the support of the Department of Scientific and Industrial Research, launched a new monthly publication—*Russian Castings Production*. This is a complete cover-to-cover translation of the Russian foundry journal, *Liteinoe Proizvodstvo* and the first issue has already been well reviewed. Subscriptions are coming in steadily from firms, technical bodies and libraries in this country and abroad. Each issue contains about 52 pages and is published four months after the appearance of the Russian original. It is one of 17 such translations sponsored by the DSIR.

Two broadsheets, four-page leaflets on topics of wide general interest to the ironfounding industry, have been issued and circulated to all members —Broadsheet No. 3 *Bottling Clays for Cupola Tap Holes* and Broadsheet No. 4 *Relationship between*

Crack-detection testing of diesel cylinder-head casting—an example of the Association's work in co-operation with users of castings.



Micrographs showing the structure of 30 per cent. chromium iron; (top) refined by nitrogen, and (centre), by titanium; the bottom illustration shows the sigma phase developed after high-temperature heat-treatment.

Composition, Strength and Structure (or Hardness) of Grey Cast Iron. Requests for several hundred additional copies have been received since the original circulation. "Physical and Engineering Properties of Cast Iron," by Dr. H. T. Angus, deputy director, published in May 1960, has proved to have a wide appeal and some 1,200 copies have now been sold.

Courses and Lectures

Two courses on sand testing and control were held at Alvechurch during the year. Eighteen representatives of member-firms attended these courses which last for a full week.

In order to direct the attention of members to the results of the Association's work already published in the *BCIRA Journal*, a series of one-day lecture courses on "Defects in Grey Iron Castings" started in June. The first three conferences at Birmingham, Sheffield and Manchester were attended by 265 representatives of members-firms; further courses are being arranged at other regional centres. Other courses along the same lines are planned and the next one will be on "Work Simplification." It is intended to make these a regular feature of the Association's activities.

Twelve external reports by members of staff published in technical journals have been made available to members.

Among the papers presented to other bodies, there were three of particular interest. Mr. D. A. Taylor read a paper on "Improvements to the CO_2 Process" to the annual convention of the American Foundrymen's Society at San Francisco in May. In the same month Mr. A. D. Morgan and Mr. J. M. Greenhill presented a paper on "Practical Observations on Mould Stability as a Factor Controlling the Soundness of Grey Iron Castings" and Mr. G. N. J. Gilbert gave one on "Impact Testing of Cast Iron" to the annual conference of the Institute of British Foundrymen at Cheltenham. Mr. W. B. Parkes, assistant director, gave a series of lectures on "Moulding Sands" to various branches of the Institute of British Foundrymen during March and April. In all more than 40 lectures were given by members of staff.

Over 950 visitors were received at Alvechurch during the year. There was a particularly large number of overseas visitors including a party of 30 German foundrymen representing the Rationalisierung Kuratorium der Deutschen Wirtschaft, North Rhine Westphalian Section, a group of 25 Belgian foundrymen who came to this country at the invitation of the Institute of British Foundrymen, a small party of Russian technologists on a visit arranged by the Institute of Vitreous Enamellers, and members of the Japanese Foundry Industry Productivity Team.

The Report is signed by Mr. Richard Miles, president; Mr. H. J. V. Williams, chairman of Council, and Mr. H. Morrogh, director.

(Appendices to the Report list ordinary (B) members of the Association, give its Committee Structure, the membership of various committees and sub-committees, the reseach programme for 1961-62, papers published, July 1960-61; lectures and papers presented to outside organizations; staff membership of external committees and attendance at conferences, in addition to names and countries of overseas visitors, 1960-61 and a complete list of staff of the Association.)

Carbon-dioxide Process

*By A. D. Sarkar, B.Sc., B.Eng.**

In the last issue of the JOURNAL was published the first section of a survey of the current state of knowledge relating to this Process. The main topics dealt with covered the history and development of the technique, gassing, and part of the Author's examination of the hardening mechanism. In this final section the latter subject is concluded and the further aspects considered include: sand reclamation, gas evolution, metal penetration, and the physical properties of the moulds.

(*Continued from page* 541)

Clay Addition

A certain percentage of clay has been added to sodium-silicate bonded sand to impart sufficient green strength to enable patterns to be stripped before the gassing of large moulds. The effect of clay, however, is to lower strength properties on standing—bentonite being found more harmful than china or ball clay.[8, 14] This reduction in strength has been found to be proportional to the amount of clay added.[20]

SAND RECLAMATION

Considerable doubt has been expressed regarding the re-use of CO_2 sands because of the possibility of the increased enrichment of the low melting point sodium compounds present in the sand. However, the recovery of used sand, either wholly or in part, is important for economical reasons. Taylor[20] prepared a silica sand with 4 per cent. sodium silicate of SiO_2/Na_2O ratio 3.3 and viscosity 350 centipoises. After gassing with carbon dioxide and drying at 200 deg. C., the sand mass was crushed and rebonded with another 4 per cent. sodium silicate, and the procedure repeated several times. Falling-off in as-gassed strengths was observed after each reclamation if sodium silicate was added alone. Compressive strengths equal to that of the original sand could, however, be restored if a specific amount of water was added to the reclaimed sand each time. It appeared that an increased amount of water addition was necessary with increasing cycles of reclamation of the original sand.

Mould/Metal Reaction

The effect of repeated use of reclaimed sand was assessed by Warneke[12] from the point of view of mould erosion, scab and general surface appearance using the standard test block of the Steel Founders' Society of America. The block is essentially a 6-in. cube with a 4 by 6 by $\frac{5}{16}$-in. thick appendage on top moulded *in situ*. Metal was introduced through this thin wing to create severe casting conditions. A 4 per cent. silicate-bonded sand was crushed, after gassing, to be reclaimed five times successively. To each series of reclaimed sand, 20 per cent. of new sand was added to keep the grain-fineness number within limits. Reclamation was carried out in a pneumatic scrubber and an aerated muller. Examinations of the surface conditions revealed that even after the fifth reclaim no deterioration of casting appearance occured. Explanation was not offered, but, in fact, in each case a considerable improvement in casting appearance was observed after the third reclamation. It would be interesting to investigate whether the amount of sodium ion reaches an optimum value and is related to the surface finish of the castings in view of the observation[8] that a viscous layer of a ternary slag $Na_2O/FeO/SiO_2$ forms at the metal/mould interface accompanied by better surface finish as the section thickness or the pouring temperature of the steel is increased.

Bentonite Additions

The same test block has been used by Middleton[25] to establish the permissible amount of returns when some bentonite is added to a sodium-silicate carbon-dioxide bonded sand. Reclamation was done after hardening a sand bonded with 4.5 per cent. proprietary binder with 1.5 per cent. bentonite and 1 per cent. dextrine. In the first series of experiments, various proportions of bentonite were added to a sand mix of 5 to 100 per cent. returned sand, and the remainder Chelford sand, in order that similar green-strengths could be achieved while the moisture content was kept constant. The moulds were cast with a 0.3 per cent. carbon steel at 1,590 deg. C. Castings produced from moulds incorporating 25 per cent. or more used CO_2 sand gave unsatisfactory results, the degree of erosion or scabbing rising with increasing additions of returned CO_2 sands. Only a maximum of 12.5 per cent. reclaimed sand could be incorporated in a fresh batch of sand if casting quality was to be preserved. A similar series of experiments were carried out keeping the amount of added bentonite constant at 5 per cent., and under such conditions as much as 50 per cent. returned sand could be used with advantage. In both series of tests dry strengths fell as increasing amounts of reclaimed sand were used, and in the latter case where a constant amount of clay was added, green-strengths increased for up to 100 per cent. returned CO_2 sand. Middleton suggests, and confirms by further tests, that decreased dry-strength occurs because of un-

* At the time of writing this article the Author was with Grayson Rollo and Clover Docks, Limited, as foundry technical assistant to the works manager.

Carbon-dioxide Process

gassed and decomposed sodium silicate diluting the new sand, and causing scabbing.

The difficulty of using either fully- or incompletely-gassed returned sand has been demonstrated by Bidwell[26] in the light of cationic-exchange phenomena for a clay having a high base-exchange tendency, when clay is used in sodium-silicate bonded sands. A reaction analogous to that in connection with clay slip would be expected:

(4) $(ClayOH)_2\ Ca + CaSO_4 + Na_2SiO_3 \rightarrow$
$2\ (ClayOH)\ Ca + CaSiO_3 + Na_2SO_4$

Such interchange of sodium ions from the binder can be prevented by adding similar ions and sodium carbonate has been found to be most effective and economical. To illustrate the deleterious effect of returned clay-bonded sand with 1 to 5 per cent. clay and 1 to 3 per cent. moisture, an experiment was carried out in which a new mix gave a bench life of one hour, when freshly milled, which dropped to 20 minutes when returned CO_2 sand was used. To obtain the best results when using returned clay-bonded sand, sodium-carbonate addition should be preceded by strong milling to break down all lumps in order that excess negative charges in the clay sheets which are abundantly exposed, would readily incorporate the cations from the added sodium carbonate and the binder is left free to perform its hardening function. The use of residual CO_2 sand from the storage bin should emphatically be avoided. It is always possible to wash the used CO_2 sand in water and re-use, after drying, with fresh additions of binder material. A pilot plant consisting essentially of an inclined trough having a helical shaft with series of paddles in it has been reported.[8] Water was introduced by a spray pipe and the pre-crushed sand was washed at the rate of 1½ to 2 tons per hour. As much as 80 per cent. of the soluble alkalis was removed and properties comparable with those of new sands were achieved. There could be little doubt as to the economics of sand reclamation by the washing method when weather conditions are suitable for outdoor drying.[27]

Gas Evolution

The total amount of gas evolved from a carbon-dioxide hardened core is low.[3, 28, 29] When sodium-silicate binder is added without any foreign additive, the main evolved constituent would be steam and, provided the original sand is dry, the amount of gas given off would be at a minimum. The initial rate of gas evolution is slightly higher than that experienced with oil-bonded sand, but the total amount of gas evolved is lower than with most of the drysand mould materials. Very-rapid initial rate of gas evolution has been the cause of blowholes in aluminium castings which were absent in oil-bonded sands because of the initial incubation period observed with oil sands.[29] When some additive is employed, the amount of gas evolved would increase with increasing proportion of the additive and its degree of volatility. For example, for a sand with 50 per cent. each of silica and chammote, five parts binder and half-part asphalt, the gas composition was 31.2 per cent. CO_2, and 21.5 per cent. CO at 1,100 deg. C.[25] The total volume of gas was reduced when the asphalt addition was omitted.

Thermal-conductivity

Direct temperature measurements of cores or moulds used for such metals as steel[29] and gun-metal[30] and plotting temperature against time, show that the apparent thermal conductivity of carbon-dioxide hardened sands lies intermediate between normal dry and greensand moulds. Hall[31] measured the apparent thermal-conductivity of sodium silicate/CO_2-bonded sands up to the temperature of 250 deg. C., by producing temperature gradients after heating the central axis of a 2-in. dia. AFA compact with a heating filament and measuring temperatures at two radial distances. The mean thermal-conductivity km. was calculated from the equation,

$$(5) \qquad \text{km.} = \frac{IV}{T_1 - T_2} \cdot \frac{\log_e \frac{r_2}{r_1}}{4.2 \times 2\pi l}$$

Where, I is the current, in amps., in the heating filament; V is the volt drop across a length l, and, T_1 and T_2 are the temperatures at radial distances r_1 and r_2 respectively.

Substitution of data obtained showed that sodium-silicate bonded sand has a high apparent thermal-conductivity at room temperature, which falls rapidly below oil-bonded sand as the temperature is increased possibly because of changes occurring in the binder film. There is further confirmations of such behaviour of water-glass bonded sand.[32, 33]

Metal Penetration

The occurrence of metal penetration for any mould material depends on x, the diameter of the pore space between two adjacent sand grains and T the surface tension of the liquid metal. Numerically, the resistance to metal penetration P, is expressed as,

$$(6) \qquad P = \frac{T}{x} \ ,$$

for the special case where the contact angle between the liquid meniscus and the sand grain is 180 deg.[34]

Dry silica gel is extremely porous[35] and this may account for the high permeability recorded for sodium-silicate carbon-dioxide bonded sand because of the apparent increase in pore space. The enhanced metal penetration effects in CO_2 sands have been attributed by Schumacher[24] to the characteristic expansion behaviour of quartz sand. On heating quartz aggregate in the range of α to β quartz transformation, a contraction occurs preceded by a steady expansion. This contraction takes place rapidly over a small tempera-

ture interval giving a volume change of almost 3.5 per cent. in a temperature interval of 100 deg. C. Experiments with the expansion behaviour of a number of barrel cores point to the fact that as the temperature is raised above 600 deg. C., cracks appear with attendant seepage of liquid metal. Complete freedom from sand burn-on or metal penetration is reported for steel castings specially when the cast section is heavy or the pouring temperature is high. Such anomalous behaviour has been attributed[8] to the formation of a ternary slag of nominal composition $Na_2O/FeO/SiO_2$ at the mould/metal interface.

Attempts to obviate metal penetration in CO_2-hardened sands include the incorporation of suitable additives and the extension of the temperature zone in which the transformation contraction of quartz occurs. The addition of coal-dust has also been recommended.[36] An empirical rule is that for this additive an addition equal to twice the percentage of the section thickness of the casting should be made. On the other hand, with pelleted pitch, the percentage addition should be equal to the section thickness.[8] Experience has clearly established, however, that if hard ramming is not adhered to severe metal penetration could be expected. Addition of a 10 per cent. iron oxide can cause the transformation temperature to be extended some 400 deg. C.[24] Increasing grain fineness should resist metal penetration since the available pore space would decrease. However, amounts of fines to be allowed may be limited because of the consideration[37] that excess binder and gas are required to develop optimum strengths in fine sands. Use of calcined-chromite ore with 1 to 1.4 per cent. moisture and a 5 per cent. water-glass bond has been recommended as a safeguard against defects pertaining to high thermal stresses in the mould material.[38]

Strength at High Temperature

In a series of experiments, to study the hot-strength characteristics of CO_2-hardened sands, Morey and Lange[36] heated sodium-silicate bonded 2 by 2 in. AFS specimens for 30 minutes at 982 deg. C. Ungassed specimens had very little rigidity and suffered an increase in diameter by 3 per cent. On gassing the specimens for as little as 5 seconds, this radial expansion was reduced to 0.75 per cent. To accentuate the experimental conditions, 2 by 2 in. steel cylinders were placed on the AFS specimens and heated at a few selected temperatures up to 982 deg. C. Minimum creep occurred when the gassing time fell in the region where the as-gassed strength gives a linear relationship with gassing time. When this period of gassing was passed, excessive creep was noticeable even at as low a temperature as 649 deg. C. Strengths under compressive load have been measured at temperatures above room temperature by Evans and White[39] for a sodium-silicate bond having a 2.50 SiO_2/Na_2O ratio with and without sugar additions. Specimens were soaked at various temperatures for a period of 10 minutes and destroyed, under compression, in the furnace. Gassed specimens gave considerable scatter of results and ungassed specimens were tested after drying at 200 deg. C. for 2 hours. With the straight sodium-silicate bond two strength peaks were observed one at 250 deg. C. and a second at 530 deg. C. Fall off in strength from both peaks was rapid. With samples containing 0.5 per cent. syrup, the first fall in strength was at a lower temperature and the peak was not so sharply defined. The reason for the rise in strength is accounted for as due to dehydration of the specimens and is verified by comparing loss in weight in the same temperature range of previously-dried samples heated under similar conditions. The loss of moisture up to 260 deg. C. and in the temperature range 360 to 540 deg. C. is rapid. In the temperature region where strength is falling, moisture loss slows down. Fall in strength is attributed to some melting of the bond and is substantiated by observations that within the range of falling strength the specimens failed by subsidence while the other form of failure was by shear. It is difficult to explain on this basis, however, why some melting should occur in the temperature range of the first fall in strength and cease thereafter. What is possibly a more logical explanation arises from the work of Taylor[29], who tested hot strengths of gassed specimens up to 1,400 deg. C. Dehydration of the samples caused the strength to increase up to 400 deg. C. A rapid fall in strength is noted in the temperature range 400 to 600 deg. C. due to the reformation of sodium silicate. Above 700 deg. C., the binder was completely fluid and samples lost all strength. Development of hot-strength peaks is an important consideration from the point of view of impeding the contraction of a casting. Hot-tears have not, however, been experienced to any great extent with the carbon-dioxide process.[40] A very detailed survey[41] with a steel test casting, has led to the inference that the propensity to hot tears is not any greater with the carbon-dioxide process than is experienced with drysand castings.

Retained Strength

The presence of some liquid phase is confirmed by measuring the compressive strength during cooling in the furnace up to room temperature after heating specimens to various temperatures above the ambient temperature[29]. On cooling from 340, 580 and 800 deg. C. respectively—the region of falling hot-strength—an initial rise in retained strength is observed. On the other hand, test pieces cooled from 440 deg. C.—the rising hot-strength range—no initial rise in strength is noted during cooling. An understanding of the behaviour of silica aggregates, with or without any mineralizers present is important in order to elucidate the behaviour of silicate-bonded sands during hot-strength measurements or the evaluation of retained-strength of the sand mass at room temperature, that is, the strength recorded after the specimen has been cooled to room temperature from some elevated temperatures. Ford and White[42] consider that silica aggregates, at and above the fusion temperature of the bond, are held together

Carbon-dioxide Process

by a Newtonian liquid which forms lenses at points of contact under the force of capillary suction. The resistance to shear is offered by the total cohesive force F, between the grains which, for simple cubic packing, is given by:

(7) $$F = (\pi\gamma/4R)\ f\ (\theta)$$

Where γ is the surface tension of the liquid bond, R, the radius of curvature of a particle, and θ is a geometric factor dependent on the amount of liquid bond present between the aggregates.

In other words, with decreasing surface tension of the liquid bond, hot strength would diminish. On cooling, however, the surface tension of the sodium silicate would increase[43] and very-high retained strength would result. In practice, fortunately, room temperature retained strengths, are not as high as the consideration of equation 7 would indicate. Because of devitrification much of the bond developed due to liquefaction of sodium silicate and its subsequent freezing would be disrupted. Chaklader and Roberts[44] fused translucent silica from 1,000 to 1,400 deg. C. The modulus of rigidity decreased as the amount of crystoballite increased. Large arrays of cracks were visible on devitrified specimens under a hot-stage microscope. Specimens under shearing forces should fail at low stresses, since on heating, progressively more crystoballite would form and be dispersed in a homogeneous glass. On cooling, areas of stress concentration would emerge and fissures generate due to the differential contraction between the cooling glass and the crystoballite, since the rate of thermal expansion of the latter during the $\alpha \rightleftharpoons \beta$ inversion is about 20 times as great as silica glass. Such transformations to crystoballite would occur in a sodium-silicate-carbon-dioxide bonded sand within a short period of time because of the presence of alkali, *e.g.*, Na_2CO_3.[20]

After heating sodium-silicate bonded sand to various temperatures and plotting the retained-strengths at room temperature against the various soaking temperatures, a peak is observed in the region of 200 deg. C. because of dehydration. Strength falls to a minimum around 600 deg. C. because of gel shrinkage, and then rises to a peak around 900 deg. C. and falls thereafter[45]. The intensity of the second peak will clearly depend on the effectiveness of the liquid bond when it freezes. The interpretation of room-temperature retained-strength curves would lead to the conclusion that de-coring would be extremely difficult if the sand reached high-peak strengths. Cores heated to temperatures above 1,100 deg. C. or in the range 300 to 600 deg. C. should be easily fettled. The approach to improved shakeout has been to incorporate various additives in the sand so that the peak strengths would be reduced. LeServe and Segrove[46] recommend 1.5 per cent. chalk addition to lower the high-temperature peak. Wood flour is recommended for light-to-medium castings[47], and coal dust, pelleted pitch, ammonium chloride, invert sugar and several other additives have been used with varying degrees of success.[48, 49, 50]

REFERENCES

[1] A. Kirkham, *British Foundryman*, 1958, **51**, 323.
[2] G. E. Parramore, FOUNDRY TRADE JOURNAL, 1957, **102**, 325, 361.
[3] A. Tipper, FOUNDRY TRADE JOURNAL, 1956, **100**, 99.
[4] A. Talbot, *Proc. Inst. Br. Foundrymen*, 1955, **48**, B.25. FOUNDRY TRADE JOURNAL, May 26 and June 2, 1955.
[5] J. Romano, A. Dorfmueller, Jr., *Foundry*, 1957, Oct., 104 to 107.
[6] J. Romano, A. Dorfmueller, Jr., *Foundry*, 1958, **86**, 96 and 98.
[7] D. Setchfield, L. B. Zylstra, *Ibid*, 1959, **87**, Jan., 170 to 174.
[8] D. V. Atterton, *Modern Castings*, 1956, **30**, August 36.
[9] T. E. Barlow, *Foundry*, 1956, **84**, March, 108 and 109.
[10] T. E. Barlow, *Modern Castings*, 1956, **30**, Aug., 45.
[11] D. L. Longeuville, *Foundry*, 1960, **88**, March, 189, 192.
[12] G. C. Warneke, *Modern Castings*, 1959, **35**, No. 6, 95 to 99.
[13] R. Ziegler, G. Hammer, *Giesserei-Nachrichten*, 1958, **5**, May, 15 to 19.
[14] D. V. Atterton, *Proc. Inst. Br. Foundrymen*, 1955, **48**, B.45. FOUNDRY TRADE JOURNAL, May 5 and 12, 1955.
[15] T. Taki, *Foundry*, 1960, **88**, November, 142.
[16] F. W. Nield, D. Epstein, *British Foundryman*, 1957, **50**, Sep. 457 to 465.
[17] J. G. Vail, Soluble Silicates, **1**, 1952, Reinhold Pub. Corp., N.Y.
[18] C. B. Hurd, *Chemical Reviews*, 1938, **22**, 403 to 420.
[19] C. E. Wulff, *Modern Castings*, 1958, **33**, March, 81 to 85.
[20] D. A. Taylor, *Proc. International Foundry Congress*, Liege & Brussels, Sept. 28 to Oct. 4, 1958, Paper 33, 639 to 661.
[21] E. A. Lange, R. E. Morey, *Modern Castings*, 1958, **34**, July, 41 to 49
[22] E. Hatschek, Journal of Physical Chemistry, 1932, **36**, 2904.
[23] H. Nishihara, A. Yokoyama, *Imono*, Journal of the Japanese Foundrymen's Society, **32**, Jan., 9 to 18, 1960.
[24] W. Schumacher, *Foundry*, 1959, **87**, March, 69 to 75.
[25] J. M. Middleton, *British Foundryman*, 1960, **53**, 53.
[26] H. T. Bidwell, FOUNDRY TRADE JOURNAL, 1959, **107**, 383.
[27] D. C. Nevin, *Ibid.*, 1961, **110**, June, 821.
[28] W. Schumacher, *Foundry*, 1956, January, 88.
[29] E. J. Jago, Foseco Foundry Developments, No. 4, 1957, February.
[30] A. D. Sarkar, *British Foundryman*, 1959, **52**, 458.
[31] C. Hall, Foseco Foundry Developments, No. 3, 1955, July.
[32] M. R. Shesadri, A. Ramachandram, *British Foundryman*, **54**, 130.
[33] Second report of sub-committee T.S.46, *Ibid*, 1959, **52**, 66.
[34] J. H. Gittus, *Iron & Steel*, 1960, **33**, August, 429 to 433.
[35] W. Schumacher, *American Foundryman*, 1954, September, 46 to 49.
[36] R. E. Morey, E. A. Lange, *Foundry*, 1959, **87**, April, 189 to 198.
[37] G. D. Haley, J. L. Leach, Modern Castings, 1961, **39**, 121 to 124.
[38] F. Klat, Slevarenstvi, 1960, **8**, (6), 203.
[39] J. L. Evans, J. White, *British Foundryman*, 1958, **51**, 615.
[40] F. M. Scaggs, *Modern Castings*, 1956, **30**, August, 46 to 48.
[41] J. M. Middleton, *British Foundryman*, 1960, **53**, 67.
[42] W. F. Ford, J. White, *Trans. Brit. Ceram. Soc.*, 1957, 56, 309.
[43] L. Shartsis, S. Spinner, J. Research NBS, 1951, **46**, 385 to 390.
[44] A. C. D. Chaklader, A. L. Roberts, *Trans. Brit. Ceram. Soc.*, 1957, **56**, 331.
[45] A. D. Sarkar, in the press.
[46] F. LeServe, H. D. Segrove, FOUNDRY TRADE JOURNAL, 1957, **102**, 409.
[47] M. Jeancolas, X. Virolle, *Fonderie*, 1958, 154, Nov., 495 to 504.
[48] L. Petrzela, Slevarenstvi, 1958, **6**, May, 129 to 137.
[49] FOUNDRY TRADE JOURNAL, 1960, **108**, June, 764.
[50] H. T. Bidwell, *British Foundryman*, 1958, **51**, 371.

International Factory Equipment Exhibition

Equipment and machinery produced by over 350 firms will be seen at Earls Court, London, from November 13 to 18 when Dr. Richard Beeching, chairman of the British Transport Commission, opens the ninth International Factory Equipment Exhibition. Two conferences running concurrently with the exhibition, entitled "Efficiency in Today's Factory" (Monday to Wednesday) and "Producing for European Markets" (Thursday), will include topics "Organizing for Product Quality," "Fitting the Job to the Worker," "Industrial Change and Human Effects," and "The Effective Use of Capital." A special feature will be the parades of protective clothing and personal safety equipment. Among equipment demonstrated will be: A new storage unit mounted on ball-bearing wheels which run on steel tracks; a new heat and oil resisting V-link belting capable of transmitting higher horsepower; the application of aluminium as a cladding in steel chimneys to overcome corrosion from flue gases, by keeping the chimney walls above condensation point; a new micro-measuring instrument for inspection and quality control which magnifies from 7 to 3,000 times, and ultrasonic sensing and switching units for the detection of solids or liquids, opaque or transparent objects and ferrous or non-ferrous metals at a wide range of distances.

Engineering Materials and Design Exhibition

Considerable Foundry Participation at Earls Court. November 13 to 18.

BRITISH STEEL FOUNDERS' ASSOCIATION

The wide representation of the foundry industry at the Engineering Materials and Design Exhibition is amply demonstrated in the following preview of those sections for which information is currently available. That the display opportunities for cast products offered by such an event have been well taken up, may be appreciated from the selection of pictures shown here of exhibits displayed or depicted on the British Steel Founders' Association's stand (Figs. 1 and 2).

The advantages of steel castings, compared with forged or fabricated steel, will be demonstrated with 35 examples from members of the British Steel Founders' Association on *stand 10B* at the Engineering Materials and Design Exhibition, Earls Court, from November 13 to 18. The exhibits have been provided by major steel founders throughout Britain, and represent a wide range of applications. They are practical examples of the way in which the employment of steel castings can save direct cost or weight with further economies from longer life and reduced maintenance. Steel foundry techniques have advanced rapidly in recent years as the result of continuous research into material specification and utilization. The results have meant greater freedom for the designer to introduce strength or lightness where needed, particularly when the steel-foundry engineers are consulted by customers at the beginning, and a close collaboration maintained.

One of the most interesting examples of weight saving on exhibition will be a gear-case for a railway locomotive oil engine (Fig. 1) (*a*). It is manufactured on a quantity production basis in BS 592 grade A steel and has sections of 0.20 in. tapering to 0.10 in. It measures 37-in. by 35-in. by 6½-in., and weighs only 1 cwt. 2 qr. 26 lb. Until recently, steel castings of this nature have often been heavier than would be required by service-stress considerations because there has been a minimum limit to the section thickness which could be cast. The remarkably-light sections of this casting represent an important advance in that, for the first time, they conform with the optimum design requirements without any excess weight. This casting illustrates the freedom of design given by steel castings, where the general shape is dictated by overall and local stresses. Thin-walled castings are particularly suitable for the railway market, and the founders concerned have every hope of a growing demand.

An instructive example of consultation between designer and foundry engineer is the pile-tube for the Dungeness power-station water-intake cooler-pile (Fig. 2) (*a*), represented on the stand by a 1/10th-scale model. The foundry decided that the tubes should be cast in eight separate 10-ft. lengths, plus the helix, and joined by welding. The Carbon-dioxide Process was used for core-making and moulding to give the finish and close tolerances required, weld-preparation at each end of the tubes was machined, and magnetic particle crack detection was applied to all welds. The castings were highly successful and delivered on time, beginning five months from the date of the first consultations.

The stand includes many other examples of savings in weight and cost which steel castings have brought to many industries. Among these are:—

Mining: A ball-thrust swivel box, for colliery suspension-gear, cast to BS 1456 specification and fully machined in the bore to suit the retaining nut and high-tensile shank. The whole assembly is proof loaded and has a safety factor of 10 to 1, but the steel casting has considerably reduced the machining-time required compared with similar boxes machined from rolled bar.

Road transport: A hitch plate, which as part of an articulated-road-vehicle coupling device, has replaced fabrications, whilst giving a service and life of at least equal duration, but with easier and cheaper production and a reduction in machining time.

Refining: Steam-cooled tube-support columns for cracking-furnaces at an ethylene refinery. These were cast in four lengths and welded together to give maximum dimensional-accuracy and soundness under test pressures of 1,000 lb. per sq. in. They have considerably greater strength and rigidity than those made earlier in other materials, and the flexibility of casting design enables the supports to be used for circulating cooling steam to prevent the material handled from reaching a critical temperature.

Oil-engines: Integral cranks for Burmeister Wain engines made as steel castings to BS 592, which cost less than forgings and show a considerable reduction in machining time.

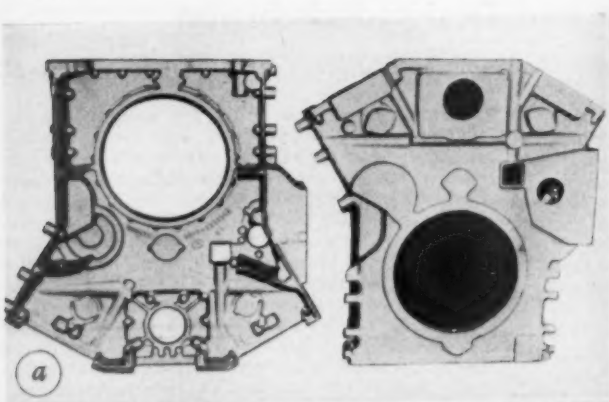
ASSOCIATION OF BRONZE AND BRASS FOUNDERS

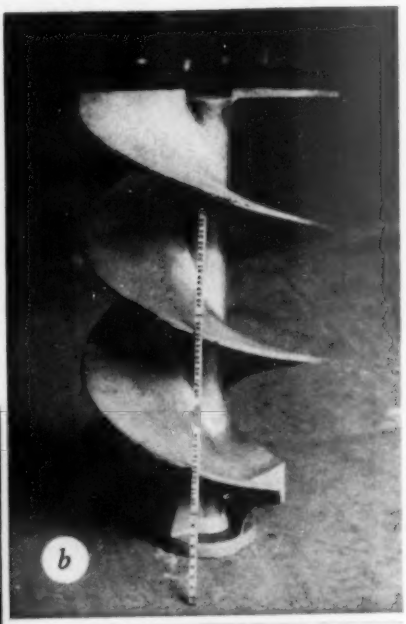
The ABBF *stand A2* at the exhibition is designed to show the wide variety of copper-base castings available to the designer and engineer, both from the point of view of types of alloy and methods of production. To this end the stand has been divided into four sections.

Right Metal

The first on the right metal, features the new British Standard 1400 1961, and the ABBF companion volume to this Standard which gives the designer data and guidance which has hitherto not been brought together in one volume, and which will enable him to select the correct grade of metal for any particular job, as well as give him information on the different types of castings methods available to him.

The casting exhibits on this section comprise





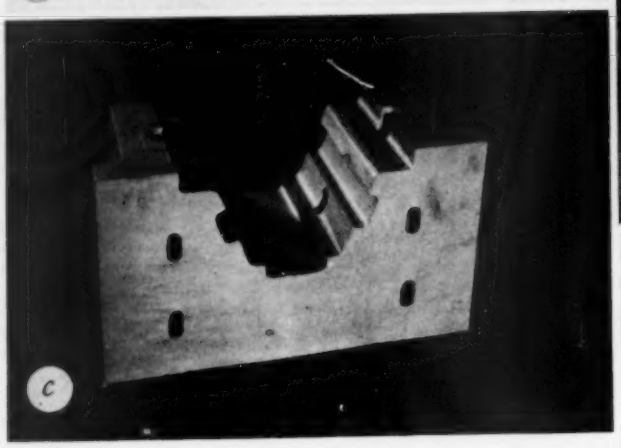


FIG. 1 *(a) to (d).—Examples of steel castings to be shown at the "Engineering Materials and Design Exhibition" next week:*

(a) This gearcase cast by K. & L. Steelfounders and Engineers, Limited for a diesel locomotive engine, represents a casting of a shape and section which would not have been possible a few years ago. *(b)* Auger for an American coal cutter, now made in this country by the Clyde Alloy Steel Company, Limited, has twin flights to the periphery of which are attached pick holders. Originally fabricated, the augers are now cast in chrome/molybdenum steel and are giving longer life at lower initial cost. *(c)* Top-chock casting for the segmental bearings on a 6-in. rotary forge gives a good example of what can now be done by Stewarts and Lloyds, Limited. The holes in the casting are 14-in long and only 1¼in. in cross-section. They were formerly produced by a long and expensive maching operation but are now cored by an air-set technique with a base-sand mixture of zircon and zircon flour. In this process the quality of the strip in the cored holes is such that no fettling, other than shot blasting, is necessary and the holes are clean and straight. *(d)* Combined gear and clutch for earthmoving equipment cast by F. H. Lloyd and Company, Limited, originally comprised two forged clutches and shaft and a cast-steel bevel gear, partially machined, fabricated together and then finish machined. The specification was then altered, cast steel clutches replacing the forgings and the component was redesigned as a one-piece casting, giving a better job at a lower price. Similar components are being re-designed in a similar manner.

ingots to BS. 1400 1961 in three grades, PB2 phosphor-bronze, AB1 aluminium-bronze and LG4 leaded gunmetal. These have been supplied by the British Bronze and Brass Ingot Manufacturers' Association and are coupled with particular examples of castings made in each alloy. They are a taxi-cab wormwheel centrifugally cast in PB2 (by the Anti-Attrition Metal Company, Limited), some AB1 aluminium-bronze die-castings—gear selector forks (made by Sagar-Richards, Limited)—and a valve-body casting made from leaded gunmetal LG4 (by Dewrance & Company, Limited), which

has recently been standardized for pressure-tight work.

Right Design

In section two, on design, examples are shown of good design as compared with previous production methods for the same product. One of these exhibited by Knowsley Cast Metal, Limited, is a 2½-in. gunmetal gate valve of a type which has been available for a number of years, and which it was recently decided to re-design to improve it in appearance and efficiency and to reduce its cost. By using shell-moulded castings the weight was reduced from 36 to 23 lb.—a saving of 13 lb.—and a considerable saving was also made in the amount of machining time necessary. Another exhibit on this panel—displayed by Langley Alloys, Limited—shows the re-design of a water-pump impeller casting from a two-piece impeller (which required machining, fitting and assembling) to a one-piece shell casting, with a considerable economy in time and expense and an improvement in efficiency.

Right Method

Section three shows several of the methods of casting avilable to the foundrymen. In the sand-casting section, J. P. Webster, Limited, will be showing a valve block in BS. 1400 LG2 illustrating a type of casting produced in greensand moulds. A photograph of a large aluminium-bronze impeller casting made by T. M. Birkett, Billington & Newton, Limited, illustrates the larger size of casting produced in drysand moulds. The die-casting process is represented by an aluminium-bronze die-casting which is, in fact, one of the windscreen pillars for a well-known British sports car. This is not seen by the general public as a bronze die-casting because it is chromium plated, but this method of production has been chosen because of the fine finish obtainable, and the high strength and corrosion resisting properties of the material. The Aluminium Bronze Company, Limited, are the founders.

Shell-moulded castings are featured by a number of bushes produced by Yorkshire Engineering Supplies, Limited. The wide size-range of castings which can be produced centrifugally is illustrated by a small flanged bush casting, exhibited by the Evre Smelting Company, Limited, and a photograph of a large paper-mill suction-couch roll, weighing 14 tons, produced by Millspaugh, Limited.

Continuous casting is represented by examples of round, solid and cored rods, for bushing washers, nuts, etc., as well as sections showing the diversity of shapes which can be produced by this method. Firms producing this type of casting are the Anti-Attrition Metal Company, Limited, Birkett, Billington and Newton, Limited, the Eyre Smelting Company, Limited, and Yorkshire Engineering Supplies, Limited. The Tin Research Institute have also contributed samples since the process was developed largely as a result of experimental work carried out by them. A photograph of a large tube 3-ft. dia. and 27-ft. long which has been produced by Millspaugh, Limited, can also be seen.

Right Outlook

This last section consists of two sub-sections, (1) control in the foundry, and (2) research and development. Examples are shown of the type of control which enables foundries to produce the best results and the manner in which research carried out both by the British Non-Ferrous Metals Research Association and individual member firms has, (*a*) improved existing alloys, (*b*) introduced new alloys, (*c*) given rise to quicker methods of analysis, (*d*) pointed the way to more rapid melting of bronze with consequent savings in time and fuel, as well as improved efficiency and less-harmful effects upon alloys used.

General Display

In addition to these four main sections, there is a central display of castings mostly of the larger type including a tug propeller supplied by J. Stone and Company (Propellers), Limited, a centrifugally-cast couch roll supplied by Millspaugh, Limited, and a davit cast in aluminium-bronze by Trent Foundries, Limited, as used on the "Oriana." Another casting shown is a rotor for a paper-machine refiner which has been manufactured in phosphor-bronze to BS. 1400 P1 which material has the necessary corrosion resistance and the right hardness to prepare the fibre for paper making machine stock. An additional advantage of the use of phosphor-bronze or other bronze in castings which eventually wear out, arises from the fact that once the service life of a casting is complete, it has a very high intrinsic value as scrap of known quality and composition. This casting has been produced by Millspaugh, Limited.

Another casting on this display is a Lox elbow casting supplied by J. Stone and Company (Charlton) Limited, which has been sand cast in the new BS. 1400 CMA 2C (Superston) and which is one of the most important components in the high-pressure liquid-oxygen feed system to the thrust chamber used in the Rolls-Royce rocket engine for the Blue Streak missile. Not only does it carry liquid oxygen at a temperature of −180 deg. C. and a pressure of 800 lb. per sq. in. but it also has to withstand the full thrust of 150,000 lb.

The Phosphor Bronze Company, Limited, are showing a large armature end-ring casting for a motor-generator cast in BS. 1400 1961 HTB1C which has replaced a steel fabrication.

Concurrently with the exhibition the ABBF is holding a design conference for members and their customers at the Clarendon Restaurant, Hammersmith, London, W.6, on Tuesday, November 14. Details of this appeared in the JOURNAL, October 26, page 523.

* * *

Following are some of the details of a number of other exhibitors, stands which will be of interest to foundrymen:

A.P.V.-Paramount, Limited, feature on *stand A14* carbon and low-alloy steel castings in addition to a wide range of castings in corrosion and heat-resisting compositions. Among the latter is a number of examples of high-tensile stainless-steel castings in Paralloy MPH which corresponds to the well-known

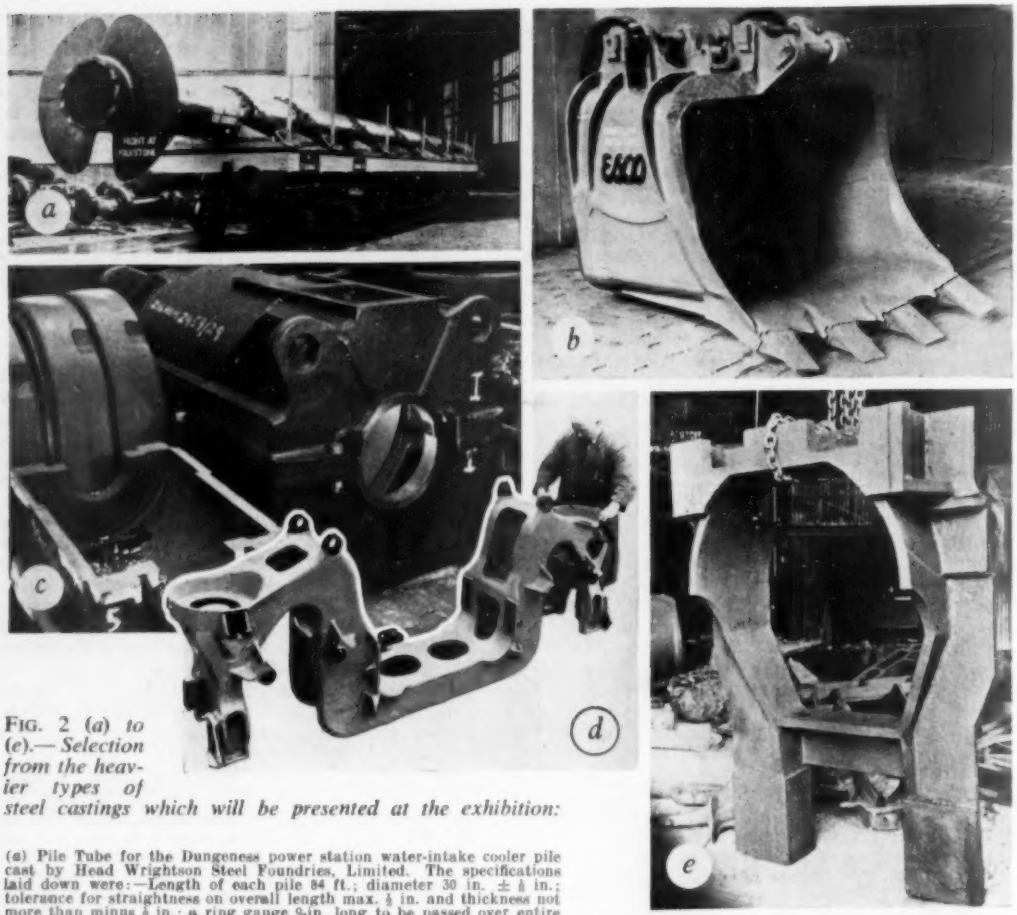


FIG. 2 (*a*) *to* (*e*).— *Selection from the heavier types of steel castings which will be presented at the exhibition:*

(*a*) Pile Tube for the Dungeness power station water-intake cooler pile cast by Head Wrightson Steel Foundries, Limited. The specifications laid down were:—Length of each pile 84 ft.; diameter 30 in. ± ⅛ in.; tolerance for straightness on overall length max. ½ in. and thickness not more than minus ⅛ in.; a ring gauge 9-in. long to be passed over entire tube length; each pile to be subjected to a strain test under various loads applied by means of 100-ton jacks. (*b*) Dipper buckets by Hadfields, Limited, have previously been made as fabrications, involving welding and riveting. This all-cast-steel bucket (assembled with a minimum of welding) gives improved performance by virtue of its improved shape, and its greater strength and rigidity. Use of alloy and manganese steel enhances its wearing properties. Allied with this is the replacement of forged solid teeth by box point and adaptors, the renewable points being steel castings. (*c*) Until recently, endplates for mill motors were fabricated, with the feet and the lifting lugs welded on to the rolled barrel. Collaboration between important users and Catton and Company, Limited, has resulted in an improved endplate made as integral top- and bottom-half steel castings. This change has resulted in a saving in cost and greater availability. These steel castings, of a total weight of 12 cwt., 2 qrts., and made to BS592 Grade A specification, give a cleaner and more attractive appearance than the earlier fabrications. (*d*) These bogie frames of complex design are made as steel castings to give the strongest frame at the lowest weight. Similar fabricated frames have been replaced in railway service by steel castings, whose superiority has been established in service as well as by tests conducted under laboratory conditions. Whilst admirable as a one-off example of the steelfounder's art, these castings are being made on a production basis by English Steel Castings Corporation, Limited, and that shown is one of 200 for the "Talgo" trains in Spain. (*e*) Steel side guide for a rolling mill cast by Brown, Lenox and Company, Limited, weighs 4,800 lb., and has replaced the fabricated unit at reduced initial total cost.

17-4 PH precipitation-hardening steel. In addition to examples of steel castings produced by the Paracast semi-precision ceramic process developed by the company is a representative range of Paralloy "Forging Quality" cast stainless butt-welding pipe fittings and flanges and of return bends and other refinery fittings.

Carter Gears, Limited, *stand A4,* will be showing a selection of their range of hydraulic variable gears, including the recently introduced 10-horsepower size AM26 Carter gear shown as a working unit and a demonstration model, specifically arranged for exhibition purposes.

Dewrance & Company, Limited, *stand F10,* will show exhibits portraying the story of castings from the initial design stages through the foundry processes to the finished product. The castings on show will include such high-alloy castings as chromium/cobalt/tungsten, and a wide range of "Endewrance" heat- and wear-resistant materials. Also shown will be castings in gunmetal, stainless steel, monel, nickel/copper, nickel/molybdenum and nickel/silicon/copper alloys. These castings, which are available either "as cast" or machined to individual needs, will be shown in several compositions as used by many different indus-

Engineering Materials and Design Exhibition

tries. Particular attention will be paid to the requirements of the pumping and food industries.

Firth-Vickers Stainless Steels, Limited, will include among the exhibits on their *stand B12* examples of centrispinnings, precision, shell-moulded and static-castings produced in their foundries, with actual applications where these products have assisted the engineer and designer. A selection of bar samples will illustrate the range of sections that Firth-Vickers produce and the standard finishes that can be obtained.

Metals & Alloys (Birmingham) Limited, *Stand H.22,* will display cast iron in the form of die-cast rod, centrifugally-cast cylinders and special sections. In the latter category will be a selection of cast-iron sections used as mould components for the glass-container industry and an ultrasonoscope on the stand is used to demonstrate that the iron offered is free from blowholes, micro-porosity and inclusions, and has a homogeneous fine-grained structure throughout. In addition, the company is displaying examples of centrifugally-cast non-ferrous components. Also demonstrated will be their range of metal-powder products.

Four member companies of the **Sheepbridge Engineering Group** will be displaying their exhibits on *stand C2.* Sintered Products, Limited, who have assisted in gaining recognition of powder metallurgy as a mature and exacting science, will be displaying a selection of units and components. Sheepbridge Stokes, Limited, first in the field with the centrifugal-casting technique, who have for many years been manufacturing high-quality cast irons for the engine-building industry, will be showing a selection of cylinder liners and various types of roller, including induction hardened units. Sheepbridge Alloy Castings, Limited, will display bi-metals castings and long-length centrifugally cast tubes together with a wide range of industrial components in special steel and alloys. Sheepbridge Equipment, Limited (Foundry Division), will be exhibiting a number of castings in both iron and steel. Particular emphasis will be given for castings resistant to abrasion using special alloyed irons. A new development in the production of large grinding balls will be included, together with a range of ordinary and corrosion resistant castings.

Other founders exhibiting on stand 10B will be: Samuel Osborn & Company, Limited, Lake & Elliott, Limited, W. Shaw & Company, Limited, Jackson Elphick & Company, Limited, Jessop-Saville, Limited, Robert Hudson, Limited, Brown, Lenox & Company, Limited, Armstrong Whitworth (Metal Industries), Limited, A.P.V.-Paramount, Limited, and Summerson's Foundries, Limited.

* * *

CONFERENCE

A conference on engineering materials and design at which representatives from leading laboratories, colleges, industry, government departments and advisory bodies will speak is to be held concurrently with the exhibition at Earls Court. Twenty-two separate lectures will evidence at first-hand the many new and interesting developments that have emerged from recent research and cover aspects of design in a most-varied range of materials and applications.

Among the subjects of the lectures which may be of interest to foundrymen are the following (with some brief synopses): Metallurgy Applied to the Selection of Materials, by D. Birchon (Royal Naval Scientific Service)—a discussion on the principles of selecting metals for the most difficult applications, illustrated by examples from service and supported by references for further study. Brief references are also made to some modern developments in metallic materials. Recent Developments in Insulating Materials, by J. Wainwright (English Electric Company, Limited.)—this paper selects a number of materials (and their applications) which have already become, or will in the next few years become, of increasing importance in electrical engineering. Among the materials discussed are epoxy and polyester resins for bonds, adhesives and castings. Designing for Die-castings, by H. K. Barton (H. K. Barton Associates)—the factors that enter into the design of die-castings are discussed under headings of styling, functional-efficiency and ease of production. Although concerned mainly with aluminium and zinc-base alloys, the paper also refers to magnesium and copper-base alloys. Practical advice is offered to the designer to enable him to gain more-efficient production rates and to achieve sound castings. The Case for Steel Castings, by F. Clymer (F. H. Lloyd & Company, Limited)—this paper deals with the advantages and design of, and answers the question, what are the economics of steel castings? Some Properties, Applications, and Potentialities of Investment Castings, by L. S. Taylor (G. L. Willan, Limited, A. G. Mason, Deritend Precision Castings, Limited)—details of this paper are not available. Steels for the Design of Low-temperature Equipment, by E. Gill (International Nickel Company (Mond), Limited—the effects of low-temperature on the properties of metals, such as strength, toughness, notch-brittleness and notch-ductility are discussed.

The conference, which will be held in the Conference Hall adjoining the exhibition, will extend from Monday, November 13 to Friday, November 17. Further information concerning the programme and registration procedure can be obtained from the Secretary, 2nd Engineering Materials & Design Conference, Commonwealth House, 1 to 19, New Oxford Street, London, W.C.1.

Other Exhibitions

At the National Housing and Town Planning Conference Exhibition being held at Scarborough, November 7 to 9, **Allied Ironfounders, Limited,**—*Stand 19 (Location B)*—are exhibiting a wide range of equipment emphasizing those models designed expressly with old people and invalids in mind. Among a selection of their other products, cast-iron rainwater and soil fittings are illustrated by a special display.

Also exhibiting at Scarborough is **Federated Foundries, Limited,** who are showing a selection of Sofono fires and solid-fuel heating appliances.

At the International Factory Equipment Exhibition at Earls Court, November 13 to 18, **Lansing Bagnall & Company, Limited,** will be displaying a wide range of materials-handling trucks, including the first showing in this country of two Towmotor Lansing diesel fork-trucks—the 540D and the 680PD of six and eight thousand pounds capacity respectively, both lifting up to 12 ft.

Building Exhibition . . . .

. . . . *at Olympia, November* 15 *to* 29

The Building Exhibition (Olympia, London, November 15 *to* 29*) will be open from* 10 *a.m. to* 6 *p.m. on Mondays, Wednesdays and Saturdays, and* 10 *a.m. to* 8 *p.m. on Tuesdays, Thursdays, and Fridays. Among stands are:*

Allied Ironfounders, Limited's exhibits, *Stand Row X, 326-328/Row Y, 315-317, Empire Hall,* at the Building Exhibition include two complete fitted Leisure kitchens —one of them made up of units in the entirely new "Leisure Line" range, shown for the first time—and the other the individually built Leisure Luxe; four complete bathroom settings—featuring respectively the Vogue, Vogue Harmony, Kent and the luxury Elysian; the popular Vogue (formerly Braemar) basin is incorporated in some of these settings; an Aga solid-fuel cooker shown alongside a selection from the current range of solid-fuel, gas-fired and oil-fired boilers; a range of Agavector warm-air heaters for operation in domestic central-heating systems and a wall display of a selection from AI cast-iron rainwater and soil fittings. The firm's rainwater and soil advisory service is a focus of practical interest for the building trade.

Federated Foundries, Limited, will show two new products on *Stand E.425.* They are the F. F. Rotor-Waste, a kitchen-waste disposal unit, and the Sofono Selecto-Heat, a combined pump and mixing valve for small-bore central-heating systems. The main emphasis of the display will be on appliances suitable for full or partial central-heating, including the Sofonomatic boiler range and continuous-burning open fires which, with the Sofono high-duty boiler-flue set, will provide hot water for central-heating and domestic purposes.

Stanton & Staveley Sales, Limited, will be represented on *Stand D.164,* on the ground floor of the Grand Hall. A 48-in. dia. spun-iron pipe will be exhibited which is claimed to be the largest diameter pipe ever to be manufactured in this country by the centrifugal process. Other exhibits will include: Foundry, basic and refined pig-irons; spun-iron pipes, fittings and flexible joints for water, gas or sewage mains and for other industrial purposes, and cast-iron drainpipes and fittings.

Newton Chambers & Company, Limited, *Stand 410,* are exhibiting the new fully-automatic oil-fired central-heating boilers—the Redfyre Centramatic 35, one of the 1961 Design Centre Award winners, and the Redfyre Centramatic 50 Series II. Also featured will be the Redfyre "Emma," a coke-filled boiler, suitable for large buildings, offices and factories.

Dallow Lambert & Company, Limited, *Stand 534-535, Row H/J,* will present, among a wide range of their dust-control equipment, a complete wood-waste suction plant working under operating conditions and serving 16 stands in the woodworking machinery section.

The 16 exhibits of **Thomas Robinson & Son Limited,** on *Stands F.512, 513, G.526, 527,* extension to the Grand Hall, Olympia, cover a wide variety of woodworking machinery, and include seven new items of equipment. The range presented includes, power-operated "moulders," morticers, planers, saws, tenoners, etc.

During the run of the exhibition on Monday, November 20, starting at 10.25, a conference is to be held on "Technical Information—its Design and Dissemination." This is a subject of real interest to those foundries making castings to be incorporated in houses.

Dinner

INSTITUTION OF PRODUCTION ENGINEERS

The annual dinner of the Institution of Production Engineers, held on Wednesday, November 1, at the Dorchester Hotel, London, attracted an attendance of well over 500 members and male guests. Mr. H. Burke, the Institution's president, was in the chair and guest of honour for the evening was the Rt. Hon. Viscount Chandos, P.C., D.S.O., M.C. Other guests included Mr. H. A. R. Binney (director, British Standards Institution); Sir Harold Roxbee Cox (president, National Council for Technological Awards); Sir Thomas Hutton; Air Marshal Sir Owen Jones (president, Royal Aeronautical Society); Mr. J. Marsh (director, British Institute of Management); Mr. T. W. McCullough (H.M. Inspector of Factories); Sir Charles Norris (director, British Productivity Council); Mr. A. A. Part (deputy secretary, Ministry of Education); Sir Richard Powell (permanent secretary, Board of Trade); the Rt. Hon. Lord Sempill, and Mr. S. Steward (director, British Electrical and Allied Manufacturers' Association).

Mr. Burke proposed the toast of "The Guests" and during his remarks he touched upon world competition, the necessity for an increased export drive and the problems of the Common Market. He suggested that a leading industrialist should be appointed as Minister of Production, his duties being to advise the Cabinet on the country's industrial and economic affairs and, aided by a planning board of industrialists, to take effective action in turn to advise and, if necessary, to direct industry. He thought also that the Government should take steps to recognize production engineering as a primary technology.

Replying to the toast, Viscount Chandos said production engineering was one of the principal "keys" to unlock the future. The most important subject was education and this, he said, must aim to inculcate a knowledge of the fundamental theory of business and, at the same time, help people to understand labour relations.

The remainder of the formal proceedings of the evening was concerned with the presentation by Viscount Chandos of the major awards of the Institution's year (see JOURNAL, August 10, p. 160) and at the conclusion Mr. R. H. S. Turner, M.A., chairman of Council, acknowledged this service on the Institution's behalf.

Planet Foundry to close

Following the policy of concentrating production at certain centres, the board of Allied Ironfounders, Limited, has decided to transfer the production of baths and domestic appliances from Planet Foundry (at Audenshaw, Manchester) to works at Bilston, Coalbrookdale and Falkirk. The firm intend that the transfer should be completed by the end of the year and to find by that time alternative employment for as many of the staff and works personnel as possible. If no alternative employment can be found, sympathetic consideration will be given to the employees affected, particularly those who have given long service.

A. HUTCHISON & SON, LIMITED, bath manufacturers, of Bromley-by-Bow, London, announce that on October 30 their business was taken over by SPA Baths, Limited, of which the chairman and managing director is Mr. H. C. Wilson-Bennetts.

Notes from the Branches

Birmingham

Following a decision taken by the Council of the Birmingham branch of the Institute of British Foundrymen (on an idea put forward by Mr. W. Wearing, of the County Technical College, Wednesbury), a meeting specially intended for associates of the Institute was held at the College on October 12. Mr. Wearing, himself an Institute member of long standing and who has been engaged in full-time technical education for a number of years, felt that more could be done to provide lectures and discussions on a level suitable for the type of person who was attracted to the Associate grade of membership in the Institute. It is a fact that many of those who joined the IBF at this grade are students and apprentices, following courses of study in foundrywork and patternmaking at technical colleges.

The meeting was addressed by Mr. J. L. Francis, a past-president of the Birmingham branch, who gave an illustrated talk on "Factors Influencing Soundness of Castings." More than adequate support was given to the speaker by an attendance of some 120. Amongst those present were Mr. D. P. Smith, the local branch president, Mr. S. N. Wrightson, honorary secretary and treasurer of the branch, Mr. A. J. Crook, Dr. H. T. Hall, head of the Department of Metallurgy at Wednesbury Technical College, Mr. Wearing and members of the teaching staffs of various local technical colleges.

The talk was followed by questions put to the speaker by members of the audience and a successful evening was ably rounded off by a vote of thanks proposed by Dr. Hall.

Mr. W. L. Beresford (left) retiring president of the East Midlands branch, introducing Mr. G. W. Fearfield, the new president.

East Midlands

The East Midlands branch opened its 1961/62 session on October 7 with an afternoon works visit to Ley's Malleable Castings Company, Limited, Derby, the party of about 120 members being welcomed by Mr. I. F. Ley, great grandson of the founder of the company, and the works manager, Mr. J. Hill. Following the tour of the works, which lasted about two hours, members were entertained to tea by the company and afterwards heard a lecture given by Mr. H. Greatorex, works metallurgist, on the "Production of Blackheart Malleable Castings." Immediately prior to this meeting, Mr. W. L. Beresford, the retiring branch president, introduced the new president, Mr. G. W. Fearfield, who then delivered his presidential address.

Mr. I. F. Ley (extreme right), a director of Ley's Malleable Castings Company, Limited, together with Mr. J. Hill, works manager, welcomes members of the East Midlands branch on the occasion of their visit to the foundries last month.

RECENT CONTRACTS received by Wild-Barfield Electric Furnaces, Limited, of Watford, Herts, for the supply of heat-treatment equipment include a new batch-type rotary-drum furnace (Austin Motor Company, Limited) a Carbodrip—a drip-feed gas-carburizing liquid—installation, Crofts (Engineers), Limited, and seven electric heat-treatment furnaces—three forced-air circulation, three horizontal batch type of standard type and one modified standard unit.

Mr. W. F. G. HARRIS and Mr. E. L. WHEELER have been appointed members of the board of Furness Withy & Company, Limited. Mr. Harris, a member of the local board in the US, is also manager of the company's office in New York, and Mr. Wheeler is head of the company's chartering department in Leadenhall Street, London. Mr. T. COLLYER has been appointed secretary of the company to succeed the late Mr. A. WALLACE.

News in Brief

THE LANARKSHIRE FIRM of Airdrie Electronics, Limited, have secured two orders worth over £200,000. One order, worth £50,000, has been placed by the G.P.O. for power units, and the other, for £150,000, by an associate company of the Pye group for transmitter receivers.

BECAUSE HE WAS WEARING PROTECTIVE FOOTWEAR, Mr. T. Hope was saved from serious injury in an accident at the Woodgate Works, Birmingham, of Birmetals, Limited. Several aluminium sheets, each weighing 10 lb., fell on his legs but he received only light cuts and bruises.

THE NON-FERROUS METALWORKS of Durban, South Africa, are building a plant in Petach Tikva, Israel, for production of ingots and smelting of non-ferrous metals. Equipment is to be exported from South Africa for the plant, and production is expected to start in the first half of 1962.

POLAND WILL SUPPLY CZECHOSLOVAKIA with foundry equipment, bulldozers, textile machines, and spare parts for building machines and excavators, under an additional protocol to the trade and payments agreement for 1961-65 (of February, 1960), signed between both countries recently.

NEARLY 1,000,000 HAND-MADE NAILS dating to the Romans have been uncovered during archæological excavations at Inchtuthil in Perthshire. The nails, from 2 to 16 in. long, weigh a total of nearly seven tons. They have been sent to Colvilles, Limited, Dalzell Steelworks, Motherwell, to be sorted into sizes.

EPSTEIN'S "GENESIS" has been lent by its owner, the Earl of Harewood, to the city of Leeds and is now on show in the City Art Gallery. It is presented in a room off the vestibule, together with two bronzes from the gallery's own collection—Epstein's bust of Jacob Kramer, and the head of Brodzky by Gaudier-Breszka.

THE NORTHERN IRELAND FACTORY formerly occupied by Lee Guinness, Limited, at Newtownards, Co. Down, has been acquired by Allen West & Company, Limited, electric motor-control gear manufacturers, of Brighton. The factory, at Comber Road, has a total area of 56,000 sq. ft., with ample room for expansion.

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, of Watford, Herts, announce a further order from Japan for mains-frequency induction-heated equipment. The equipment will have a nominal capacity of 650 lb. molten aluminium and will be employed for the low-pressure die-casting of automobile-engine components.

GERMAN FEDERAL RAILWAYS plan to replace all their steam locomotives with modern units by 1976. The number of traditional steam-powered units in service will have dropped to below the 50 per cent. mark by the end of the year. Diesel-driven engines and electric locomotives at present in operation number 1,000 of each category.

NORTONS-TIVIDALE, LIMITED, of Tipton, colliery engineers, has gained an order worth £120,000 to supply a coal-washing unit to treat 200 tons an hour to Yugoslavia. A spokesman for the firm said that this was the first order of its kind to be won by a British firm—in the past equipment had been bought from French or German concerns.

DUTCH, FRENCH, BELGIAN AND GERMAN shipyards are studying the standardization of shipbuilding, so that only about five types of vessels are needed, in an effort to rationalize European inland shipping. Up to now all ships have been built to individual specifications, involving high costs. Of ships' diesel engines alone there are over 100 types.

SIR STUART GOODWIN is to pay the cost of the £5,500 illuminated fountain in the Town Hall Square, Sheffield. He offered to do this as a tribute to the town-planning work of the present Lord Mayor of Sheffield, Alderman J. W. Sterland. The fountain will be named "The Sir Stuart and Lady Goodwin Fountain" and was opened on October 31.

A FIRM OF MAINTENANCE ENGINEERS, Bennett & Sons, are to establish a depot near Bathgate, West Lothian, for the repair and maintenance of machinery in the factories of the British Motor Corporation. An eight-acre site at Easter Inch Farm has been bought. Buildings are to be erected meantime on three acres, the other five will be kept for future development.

THE JOBBING FOUNDRY of G. P. Wilson (Engineers), Limited, Peel Street, Southampton, after the installation of an oil-fired emulsion burner to replace a coke-fired dutch oven for mould drying, has achieved an annual saving of £1,000 from an initial outlay of £350. The burner was supplied by the Camron Engineering Company, Limited, Westgate Works, Chichester.

THE NEW BOWMAKER (PLANT), LIMITED, South Wales depot at Culverhouse Cross, Cardiff, was officially opened a few weeks ago. The depot will deal with all types of Caterpillar equipment from lift trucks to the largest earthmoving machinery, and will be mainly concerned with sale of new reconditioned plant, servicing of customer's plant, and sale of spare parts.

THE SECOND ANNUAL EXHIBITION of the Yorkshire region of the Engineering Industries Association was opened at Carlton Old Barracks, Leeds, last month by the Lord Mayor of Leeds, Ald. P. A. Woodward. Sixty-eight stands in the drill hall were occupied with the exhibits of 58 firms. This was the second occasion such an exhibition has been held outside London.

RECORD DELIVERIES of 111,723 tons of finished castings were made from the iron foundry of Distington Engineering Company, Limited, a subsidiary of the United Steel Companies, Limited, during the year ended September 30, 1961. Exports of finished castings—such as ingot moulds—to Continental steelworks accounted for a substantial proportion of the deliveries.

THE SOFONO Selecto-Heat is a new appliance for improving central-heating temperature-control in small-bore domestic systems. By means of a control knob, the temperature of the radiator system can be regulated independently of the domestic hot-water supply. The device has been developed by the Grange-Camelon Iron Company, Limited, of Falkirk—a Federated Foundries company—for use with their range of boilers and high-duty boiler-flue set.

THE ANNUAL CONFERENCE organized by the *Zinn-Informationsbüro* (tin information bureau in Germany) is this year concerned primarily with metallurgical uses of tin. Professor Patterson of the metallurgy department at the Technische Hochschule, Aachen, will be in the chair, and the subjects to be discussed include tin in cast iron, aluminium/tin bearings, and the continuous casting of bronze. The conference will take place in the Haus de Wissenschaften on November 30.

THE WORLD BANK has granted a US$50,000,000 loan for the development of India's railways. It will help meet the cost of equipment and material that will be imported in the coming year. The loan, for a term of 20 years, bears 5½ per cent. interest including 1 per cent. commission which is allocated to the Bank's special reserve. Repayment of the loan will start in February, 1965. Five US commercial banks are taking part in the loan without the World Bank's guarantee.

BARNES & BELL, LIMITED, have purchased from Bairds & Scottish Steel, Limited, the Woodside Steel Works, Coatbridge, Lanarkshire. The area of the works amounts to some five acres. The premises will be used as an extension to Barnes & Bell's scrap-processing activities. Barnes & Bell, who have been established over 50 years, already operate three other works in Coatbridge. Bairds & Scottish Steel are at present owned by the Iron & Steel Holding & Realisation Agency.

MEMBERS OF THE OFFICE STAFF of F. Parramore & Sons, Limited, ironfounders, Chapeltown, Sheffield, were remembered in the will of Mr. Ernest Parramore, chairman of the firm, who died on May 24, leaving £54,420 (£52,032 net). Bequests included £50 to Mr. Thomas Edley, if still employed by the firm at his death, £25 each to other male members of the office staff with at least five years' service, and £5 for each complete year of service with the company to Mr. George Harper.

THE VACUUM-FURNACE ACTIVITIES of Efco Furnaces, Limited, will in future be handled by a new division with offices, design and manufacturing facilities at Sheerwater, near Woking, in Surrey. Mr. M. J. Severs, formerly with the furnace department of the General Electric Company, Limited, has been appointed technical manager of the new division and Mr. W. Kuyser, B.SC., previously vacuum sales manager of General Engineering Company (Radcliffe), Limited, has been appointed sales manager.

A CENTRALLY-HEATED PORTABLE BUNGALOW on show at the Ice Stadium car park, Nottingham, from October 26 until November 12, is believed to be the first of its kind in Britain. The exhibition is sponsored by the Nottingham Joint Service Committee of the Coal Utilization Council, and the bungalow was designed by the CUC. It is centrally heated and built in four sections. A thermostatically-controlled solid-fuel boiler serves five radiators as well as providing hot water. It is less than 3 ft. tall and 15¼ in. wide. There is a small display of all other types of room-heating appliances.

THE THIRD HEALTH CONFERENCE FOR EXECUTIVES is to be held on November 30 at the Connaught Rooms, London, W.C.2, when the speakers will be dealing with "Pros and Cons of Regular Medical Examination"; "Rays Harmful and Beneficial"; "The Woman Executive"; "Doctor on the Board"; "Facing Cancer"; "Safeguards for a European in Hot Climates"; "Modern Outlook in Medical Research," and "Growing Old Gracefully." Full details are available from the organizers, the Chest and Heart Association, Tavistock House North, Tavistock Square, London, W.C.1.

REPRESENTATIVES OF MANAGEMENT and workpeople closely associated with the Treforest (South Wales) factory of K.L.G. Sparking Plugs, Limited, were guests at a "family reunion" coming-of-age celebration in the Royal Hotel, Cardiff, last month. During the war years the K.L.G. dispersal factory at Treforest, which is now primarily a ceramics plant serving the main K.L.G. works at Putney Vale, London (part of Smiths Motor Accessory Division), functioned as a self-contained unit producing sparking plugs for aircraft. At one time the labour force, which is now 400, reached a total of 700.

THE COMBUSTION ENGINEERING ASSOCIATION held their annual conference at the first Northern Exhibition of Fuel and Power for Industry at the Queen's Hall, Leeds, on October 19. Among topics discussed were the measurement of air pollution and the cost of installation and maintenance of equipment to prevent it. Mr. A. R. Chapman, general sales manager of Babcock & Willcox, Limited, who presided, pointed out that because there were no Ministerial regulations concerning specific amounts of permitted emission, the application of the Clean Air Act was a matter of co-operation between the consumer, the manufacturers and local authorities.

THE NAVAL ORDNANCE INSPECTION ESTABLISHMENT in Janson Street, Attercliffe, Sheffield, celebrated its "Golden Jubilee" with an Open Day on October 19 when it was visited by the Lord Mayor of Sheffield, Alderman J. W. Sterland, and the Master Cutler, Mr. Gerard Young. They were accompanied by the Navy's Director-General of Weapons, Rear-Admiral R. E. Washbourn, the Chief Inspector of Naval Ordnance, Colonel B. G. Ralfs, R.M., and leading industrialists. The establishment was open to the public in the afternoon and evening and on show were many ultra-modern inspection devices for testing weapons, and parts of guns, shells and rockets.

THE POWDER METALLURGY JOINT GROUP of the Iron and Steel Institute and the Institute of Metals is to hold its winter meeting on December 7 and 8, at Church House, Great Smith Street, London, S.W.1. The meeting will commence at 2.30 p.m. on the 7th under the chairmanship of Dr. G. L. Miller (chairman of the Joint Group) when two discussions will be held on four papers, the first day concluding with an informal dinner at Ayrton Hall, Imperial Institute Road, London, S.W.7, for members of the Group and their guests. The programme continues at 10 a.m. on the 8th under the chairmanship of Dr. L. B. Pfeil (deputy chairman of the Group) when there will be a symposium on "sintered high-temperature compounds." Dr. Miller will again act as chairman for the afternoon sessions, when further papers will be discussed.

DISTINGTON ENGINEERING COMPANY, LIMITED, a subsidiary of United Steel Companies Limited, are to build a vertical continuous casting plant for steel billets for Scaw Metals, Limited, of Johannesburg, South Africa. The plant will be built in conjunction with Concast A.G. of Zurich, Distington's associates in the field of continuous castings, and is subject to final agreement of technical details. It will consist of a twin-strand unit, designed primarily for casting "killed" carbon and low-alloy steels into 2- to 6-in. square billets, but will initially be equipped to cast 3½-in. and 4-in. square billets. Liquid steel will be poured from a 12-ton ladle into tundishes feeding direct into water-cooled copper moulds. After leaving the spray-cooling chamber and withdrawal rolls, the solidified billets will be bent through 90 deg. and discharged through a straightening device on to runout tables, where they will be cut to length.

IF BRITAIN ENTERS THE COMMON MARKET, the United Steel Companies Limited, Sheffield, claim that they will be the biggest steel producer of any member country. Mr. W. Hawkes, commercial manager of United Steel Companies, points this out in an article in the current issue of the *Phœnix Gazette* and states that although some markets will be lost by entry and some gained, United Steel should benefit on balance. He says that United Steel's "modern and efficient plants" and "technological leadership" should stand them in good stead. He adds, "It is true that we send abroad only 1 ton out of every 10 we make, but we must not forget that ships, motor cars, refrigerators, bridges and many other things consist mainly of steel, and if these are taken into account, about 40 per cent. of our steel goes abroad." The *Phœnix Gazette* is the journal of the Steel, Peech & Tozer branch of United Steel.

Personal

Mr. H. C. BAADSGAARD has resigned from the board of Nu-Swift Industries Limited.

Mr. N. R. D. GURNEY has been appointed general manager of Davy-A.E.I. Automation, Limited. He is also a director of the company.

Mr. H. E. LEVY, chief engineer, has been appointed to the board of Foster Transformers, Limited, a company in the Metal Industries group.

Dr. J. A. GRAY has been appointed head of the new basic research group which the Gas Council is establishing at its London research station at Fulham.

Mr. J. G. E. VAN DER MERWE has been appointed a director of the Union Steel Corporation (of South Africa), Limited, with Mr. J. E. K. TUCKER as his alternate.

Mr. F. HIRST now represents John Webb & Company, Limited, plumbers' and engineers' brass founders, Crescent Works, Birmingham 9, in Yorkshire, Lancashire, Cheshire and North Wales.

Mr. J. F. KING, managing director of Morgan Refractories, Limited, a subsidiary of the Morgan Crucible Company, Limited, has been appointed a director of the parent company.

Mr. E. S. STOWE has relinquished his appointment as secretary of Triplex Holdings, Limited, and has been appointed treasurer and chief accountant. Mr. A. A. J. HARMAN has been appointed secretary.

Mr. R. H. WORMLEY, formerly Yorkshire area manager of Associated British Machine Tool Makers, Limited, has been appointed home sales manager, and has been succeeded at the Leeds office by Mr. W. G. ORMEROD.

Sir LAURENCE MERRIAM has been appointed a director of the Distillers Company, Limited. He is chairman of the British Xylonite Company, Limited, and a director of Ilford, Limited, and Municipal Mutual Insurance.

Mr. CLIFFORD HAND, for the past seven years a director and general manager of Sheepbridge Equipment, Limited (foundry division), has been appointed general manager of the new Bolton works of Walmsley (Bury), Group, Limited, papermakers' engineers.

Mr. J. D. DUNLOP has been appointed managing director of New Conveyor Company, Limited, a subsidiary of Tube Investments, Limited. Prior to his joining New Conveyor, Mr. Dunlop was works director of J. J. Habershon & Sons, Limited, Rotherham.

Mr. N. F. PARKER, managing director of Stewart and Gray, Limited, has been appointed chairman of the Vitreous Enamel Development Council in place of Mr. S. W. VICKERY, managing director of Ferro Enamels, Limited, who has resigned that position, but will continue as a director of the Council.

Opening ceremony of a new office block in Belfast for City Contractors & Plant Hire, Limited, was performed by Mr. W. H. SHARP, managing director of Thomas Smith & Sons (Rodley), Limited, makers of cranes and excavators. City Contractors is the Northern Ireland agent for Thomas Smith.

Mr. C. W. PAGE, after 34 years with the Castrol group, has been appointed sales manager of the industrial division of Castrol Industrial, Limited—a newly created post. Mr. L. COLKETT, Mr. K. C. MCCARTHY and Mr. G. H. THORNLEY have been appointed to the board of directors of Castrol, Limited, parent company of the Castrol group.

Mr. W. T. HALE, sales director of Thomas Marshall & Company (Loxley), Limited, refractory manufacturers, of Sheffield, is visiting customers in Sydney, Montreal, Hamilton, and Sault St. Marie, Canada, before joining the 24-day tour, organized by the British Iron and Steel Institute of iron and steel plants in the US and Canada.

Mr. JOHN GARNETT has been appointed the director of the Industrial Welfare Society. He replaces Mr. JOHN MARSH, who has accepted an invitation to become director of the British Institute of Management. Mr. Garnett is currently responsible for the communications section of the central labour department of Imperial Chemical Industries, Limited, at head office.

Mr. E. S. TAYLOR, head of the East European section of the overseas directorate of the Federation of British Industries, is visiting Bulgaria, Hungary and Rumania for the purpose of studying export opportunities for British industry. In particular he will enquire into possibilities of increasing exports of British capital equipment to these countries. Mr. Taylor completes his tour on November 11.

Major-General E. P. READMAN has been appointed to the board of Arthur Balfour & Company, Limited. Mr. MARK R. BALFOUR has been appointed to the boards of Darwins group and subsidiaries. Mr. J. E. ROBINSON, formerly secretary of the Darwins group and subsidiaries, has been appointed secretary of Balfour and Darwins. Mr. D. WALKER, formerly assistant secretary, is now secretary of Darwins group and subsidiaries.

Mr. MALCOLM G. WITHAM, of L. A. Witham & Company, foundry suppliers, of Glasgow, has been awarded the Sir Archibald McInnes Shaw Prize in Foundry Practice for session 1960-61. Since joining the David Dale College, Glasgow, in 1958 he has obtained first-class intermediate and second-class advanced certificates of the City and Guilds of London Institute in foundry practice, and has completed the prescribed five-year course in three years.

Mr. G. NELSON has been appointed chairman of D. Napier & Son, Limited, a subsidiary of English Electric Company, Limited. Mr. G. A. RIDDELL has been appointed a director and becomes deputy chairman and Mr. P. J. DAGLISH becomes managing director. Mr. H. E. C. DE CHASSIRON has resigned as managing director but retains his directorship. Lord NELSON OF STAFFORD, Sir JOHN PAGET, Sir ARCHIBALD HOPE and Mr. A. J. PENN have resigned from the Napier board.

Mr. G. E. EDWARDS has been appointed general manager (production) by F. W. Berk & Company, Limited. He will be responsible to Mr. F. A. Rivett, director for production at the company's works at Stratford, Baynards (Sussex), Wolverhampton, Swansea, Sendridge, London Colney and Edmonton, working from headquarters at Abbey Mills, Stratford, London, E.15. Mr. D. S. GARDNER succeeds the late Mr. E. L. PIPE as foundry sales representative in the Midlands, South Wales and the West.

Obituary

Mr. W. JENKINS GIBSON, financial director of Hadfields, Limited, Sheffield, and deputy managing director of the subsidiary, Millspaugh, Limited, Sheffield, has died at the age of 63. He had been with Hadfields since 1927.

MANAGING DIRECTOR
FOUNDRY MANAGER
or WORKS ENGINEER

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FOUNDRY PLANT BY

Richards

ENGINEERS WITH OVER 100 YEARS FOUNDRY EXPERIENCE
Phoenix Iron Works, Leicester

WHATEVER YOUR POSITION

Company News

HERBERT MORRIS, LIMITED, makers of cranes, conveyors, elevators, etc., of Loughborough (Leics)—A final dividend for the year to July 31, 1961, of 10 (12½) per cent., is recommended.

ELLIOTT-AUTOMATION, LIMITED—Application has been made to the Council of the Stock Exchange, London, for permission to deal in and for quotation for an additional £1,500,000 6½ per cent. debenture stock 1981/86.

BIRMID INDUSTRIES, LIMITED—An unchanged final dividend of 3s. per £1 share maintains the total for the year to July 31, 1961, at the previous 4s. rate. Group profits, lower as foreshadowed, amounted, before tax, to £3,016,340 (£3,597,999).

CROMPTON PARKINSON, LIMITED—Group net income for the year to June 30, 1961, expanded to £1,306,000 (£1,261,000), after tax of £1,654,000 (£1,474,000) and dividend is maintained at 12½ per cent. with an unchanged final of 7½ per cent.

MANGANESE BRONZE & BRASS COMPANY, LIMITED—Interim dividend for 1961 is being maintained at 4½d. per 5s. share, but, the directors state, whether the final (8d. previously) can be maintained, depends on the position when the full year's results and 1962 prospects are known.

SAMUEL OSBORN & COMPANY, LIMITED, manufacturers of high-speed steel and tool steels, twist drills, etc., of Sheffield—Net profit for the year to July 31, 1961, rose to £988,084 (£706,591), after tax of £1,037,774 (£869,716). In deference to the Chancellor's request, the final dividend is maintained at 25 per cent., making a total of 40 (35) per cent.

TUBE INVESTMENTS, LIMITED—Final dividend of 7 per cent., making 14 per cent. for the year to July 31, 1961, is being paid on the £35,341,313 ordinary capital. For the previous year an interim of 8½ per cent. on £16,828,702 was followed by a final of 9¾ per cent. on £35,008,573. The net profit is up to £10,364,746 (£9,923,838), after tax of £10,729,225 (£9,663,793).

STONE-PLATT INDUSTRIES, LIMITED—The directors state that it is too early to say what the company's profits will be for 1961, and consider it prudent in present circumstances to revert to the previous practice of paying 4 (4½) per cent. interim dividend. They hope, however, that the forecast of profits given in the chairman's statement last June may be achieved. The total payment for 1960 was 16 per cent.

JOHN BROWN & COMPANY, LIMITED—The company has purchased the capital of Talbot-Ponsonby & Company, Limited, precision engineers and mould and die manufacturers, of Langrish (Hants). The business is complementary to that of another John Brown subsidiary, Cravens (Machines), Sheffield, and three of the latter's directors, Mr. J. E. Owston, Mr. H. Booker, and Mr. L. Creighton have been appointed to the board of Talbot-Ponsonby.

JOHN WILLIAMS & SONS (CARDIFF), LIMITED, ironfounders and iron and steel stockholders, etc.—An increase in sales for the period October, 1960, to September this year of 20 per cent. to £3,500,000 over the previous year, established a record. Since the reorganization in 1959 into three main manufacturing divisions, sales have increased by 60 per cent. The company was planning further increases for the coming year, said Mr. Harold E. Williams, sales director, at the annual sales conference in Cardiff.

Publications Received

The IWS Supervisor's Handbook and Diary, 1962. Published by the Industrial Welfare Society, 48, Bryanston Square, London, W.1; price 5s.

This diary and handbook carries a wealth of information which every foreman and supervisor should know, but often cannot put his hands on when required. How to prepare manuscript for the typist and how to behave at meetings are typical of the information included. The sections on income tax, statistics, personnel management, national insurance, law and industry, and the factory, carry the essential information in a minimum of words. It is illuminating to learn that most people in their daily lives have about 15 numbers to memorize or keep handy—phone number, car number, works check number, insurance number and so on—and a page is devoted to space for recording these. The diary is jacketed in washable plastic, and it is suggested by the publishers that firms should order a quantity of these for distribution amongst staff whilst there is still time to have the name of the company embossed on the cover.

Die Casting News, No. 5. Published by the Zinc Alloy Die Casters Association, 34, Berkeley Square, London, W.1.

The versatility of the zinc-alloy die-casting process is well exemplified in this issue and readers will be able to confirm this by visiting the stand of the Association at the forthcoming Engineering Materials and Design Exhibition to be held at Earls Court, London, throughout the week commencing November 13. The publication reports on the activities of die-casters in supplying components for the motor-car industry and the domestic market. In the latter case, the framework of a Cona coffee machine is illustrated and its manufacture briefly described.

Corrosion Science Vol. I, No. 1. Published by the Pergamon Press, Headington Hill Hall, Oxford. Annual subscription for libraries, research institutes, etc., £7, and for private persons £3 10s.

This issue carries five articles on the subject of corrosion. Two are by Dr. J. G. Hines on aspects of stress corrosion cracks, and an important study on the anodic characteristics of mild steel in dilute aqueous soil electrolytes has been contributed by Dr. T. P. Hoar and the late Dr. T. W. Farrer. A short article from Sweden is by Mr. A. Lunden on the resistivity of various materials to attack by molten salts and metals, many of which are of the "rarer" type, and the final article is on some effects of electrolyte motion during corrosion by Mr. T. K. Ross and Mr. B. P. L. Hitchen. This phenomenon is one encountered in propellers, mixers and stirrers. The new magazine caters for the large number of scientists engaged on corrosion problems.

Cobalt No. 12. Published by the *Centre d'Information du Cobalt*, 35, rue de Colonies, Brussels 1, Belgium.

Several of the papers included in this issue deal with cast products in the form of permanent magnets, and heat-resisting alloys of the Cr/W/Ni/Co type. Though the *Centre* is located in Belgium this publication is printed in English and is very well produced.

ALBION MOTORS, LIMITED, Glasgow, have received an order from the Milk Marketing Board, valued at £80,000, for a fleet of tanker chassis and tractors. The contract calls for 27 Clydesdale haulage chassis for operation with 1,750-gall. tanks and eight Clydesdale tractors for use with tank semi-trailers.

Electrical Aids in Industry — Data Sheet **21**

Materials Handling-1

Materials handling may well be defined as the technology covering the movement and storage of everything in and about industrial or commercial premises. The term covers the handling of raw materials as well as tools; the movement of components between operations and in stores, of finished products, and of the scrap, cutting oils and process machinery; and the movement of workpeople in relation to the handling of material.

The object of a materials-handling survey is to eliminate handling as far as possible and to study the remaining operations to ascertain if they can be economically and efficiently mechanised.

Improved materials handling raises productivity, for it gives, among other benefits: greater output from a given floor space, reduction of bottlenecks, reduction in damage to products, increased speed of handling and a consistent production level.

Process integration (the combining of two or more processes in one situation or machine with no manual inter-process handling, or the mechanical linking together of two or more processes for automatic operation) is one of the preliminary steps in the development of automation.

MECHANICAL HANDLING

Many kinds of mechanical-handling equipment are in use today, each with its own attributes and uses, but in most cases there is only one type which offers the best solution to any one handling problem. Most mechanical-handling equipment is electrically operated, and the judicious use of electricity in this way can substantially increase productivity.

Main Categories of Mechanical Handling Equipment

LIFTING EQUIPMENT; OVERHEAD RUNWAYS; CRANES; CONVEYORS AND ELEVATORS; INDUSTRIAL TRUCKS.

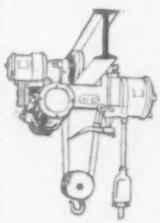
LIFTING EQUIPMENT

Electric pulley blocks are used for loading and unloading purposes, warehousing and in process work. When used with a trolley they have great flexibility. No manual effort is required, hence lifting does not cause any fatigue. They may use either chain or wire rope, and the speed of lift of both types is slower as the lifting capacity increases.

Lifting magnets are used for the handling of iron and steel in conjunction with a crane or hoist. They do away with the necessity for slings and give increased speed of movement. They can lift castings, ingots and swarf, scrap, rolled steel sections, and can be used in loading bays, foundries and steelworks.

OVERHEAD RUNWAYS

Overhead runways have many uses where lifting and/or transport are required, when frequency of flow does not warrant a conveyor, e.g., for loading and unloading lorries, in core ovens, for feeding machines, for storage, for maintenance purposes, for textile drying and interconnecting two or more buildings. A runway consists of a steel girder along which a load trolley runs. It consists of two main items: the electrified drive of the trolley (i.e., a power trolley) along the runway and an electrically operated lifting unit, usually an electric pulley block. A telpher has a cab for the operator suspended from trolleys on the runway and mechanically connected to the electrically driven trolley of the pulley blocks, thus travelling with them. Telphers are employed for handling individual loads which may be outside the range of normal electric blocks.



For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books are available on electricity and productivity (8/6 each, or 9/- post free)—'Materials Handling in Industry' is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity including one on materials handling. Ask for a catalogue.

7013/4

CUT HERE

Raw Material Markets

Iron and Steel

There is no appreciable change in the pattern of business at the iron foundries, and demands for castings approximate recent levels. At the engineering and speciality foundries, reasonably good quantities of high quality castings continue to be supplied to many trades, but overall requirements are below the capacity of these foundries. Following the motor show there are more hopeful signs of an improvement in both home and export markets, and it is expected that this will result eventually in increased demands for castings.

The machine-tool trade is busy and the foundries supplying castings to this industry are well employed. The requirements of castings by the steelworks is moderate, but fairly good demands are forthcoming from the heavy engineering trades, power and electrical plant manufacturers, and other users. Seasonal demands for castings from the domestic utensil trade have improved outputs at some of the light foundries, but more work could be undertaken. The jobbing and textile foundries continue only moderately employed.

The iron foundries are well provided with raw materials. All grades of pig-iron are plentiful, and most furnaces could step up deliveries appreciably if required. The call for low-phosphorus iron by the engineering and speciality foundries is still at fairly good levels, although recently there has been a further curtailment in deliveries from some of the foundries connected with the motor vehicle trade. Hematite and refined irons are available to requirements. Foundries in need of the high-phosphorus irons are able to obtain all required tonnages without difficulty. Apart from some special grade of scrap the foundries have no difficulty in covering for their needs. Ganister, limestone, and firebricks are readily available.

Overall demand from the re-rollers for small bars and light sections continues moderate and in consequence outputs are below productive capacity. Orders now being placed are readily completed and difficulty is still experienced in obtaining sufficient tonnage to make up rolling programmes, with the result that there is little forward booking. A fairly good demand continues for reinforcing rods but this has shown some decline lately.

The re-rollers are well provided with mild steel semis, and they can also obtain all the carbon and alloy steels required, although the latter are offered for more extended delivery. All arisings at the steelworks of suitable re-rolling defectives and crops are taken up by the re-rollers.

Non-ferrous Metals

Tin is on the move once again. This time the sharp rise in price has been triggered off by the realization that stocks in LME warehouses are too low for comfort at not much above 4,000 tons. The dwindling available supplies of tin has led to the disappearance of the seven months old contango, which has now been replaced by a backwardization and also to dealer covering on fears of being without the physical metal to meet commitments.

The upward movement in London has been mirrored in New York where the quotation is above $1.23 a pound and the market there is good and steady. Singapore has also taken its cue from London and the market has risen steadily by several points. It is difficult to see what can stop the price from continuing its rise. Demand is good, stocks are low, and production is not rising with the price. However, any real shortage which may produce a runaway price for tin would immediately raise the question of releases from the US stockpiles.

One interesting sidelight on the market is that some of the producing countries have said that unless the International Tin Council fixes the tin price limits at £800 minimum and £1,000 maximum by February 14, 1962, they would withdraw from the scheme and form a "pool" of their own.

Copper in London is featureless but the undertone is surprisingly firm which is attributed to the good pace of demand going on outside the UK. The London price is steady around £229 a ton and the US quotation is unchanged at 31 cents a pound for both custom smelters and producers.

Lead is dull in London with the price moving narrowly around £61 a ton. In the US the market is also quiet and this, combined with the weight of supplies overhanging the market, has led to a reduction in the price by ½ per cent. to 10½ cents a pound.

Zinc is quiet in London but there are not too many sellers about which is helping to maintain the price around £71 a ton. In the US the market is also featureless with the price unaltered at 11½ cents a pound.

Film Review

Precision for the Mighty. 16-mm. sound/colour film, running time 17 min., produced by Stewart Films, Limited, for the Gas Council, and available from the Council's Film Library,* Murdoch House, 1, Grosvenor Place, London, S.W.1.

This film which was shown to the Press in London last week is a propaganda publication, but not blatantly so. It depicts the application of heat—provided by town's gas—as an essential feature of a number of manufacturing processes in heavy industry. No foundry "shots" are included, but the use of gas for carburizing, flame-hardening and other heat-treatments; plate and slab heating, etc., which are shown, all have their counterparts in the production and treatment of castings. The film is intended for showing to audiences with at least some technical knowledge and will undoubtedly interest meetings of foundrymen. The photography is excellent and the plant and processes are illustrated in a manner which excludes extraneous detail.

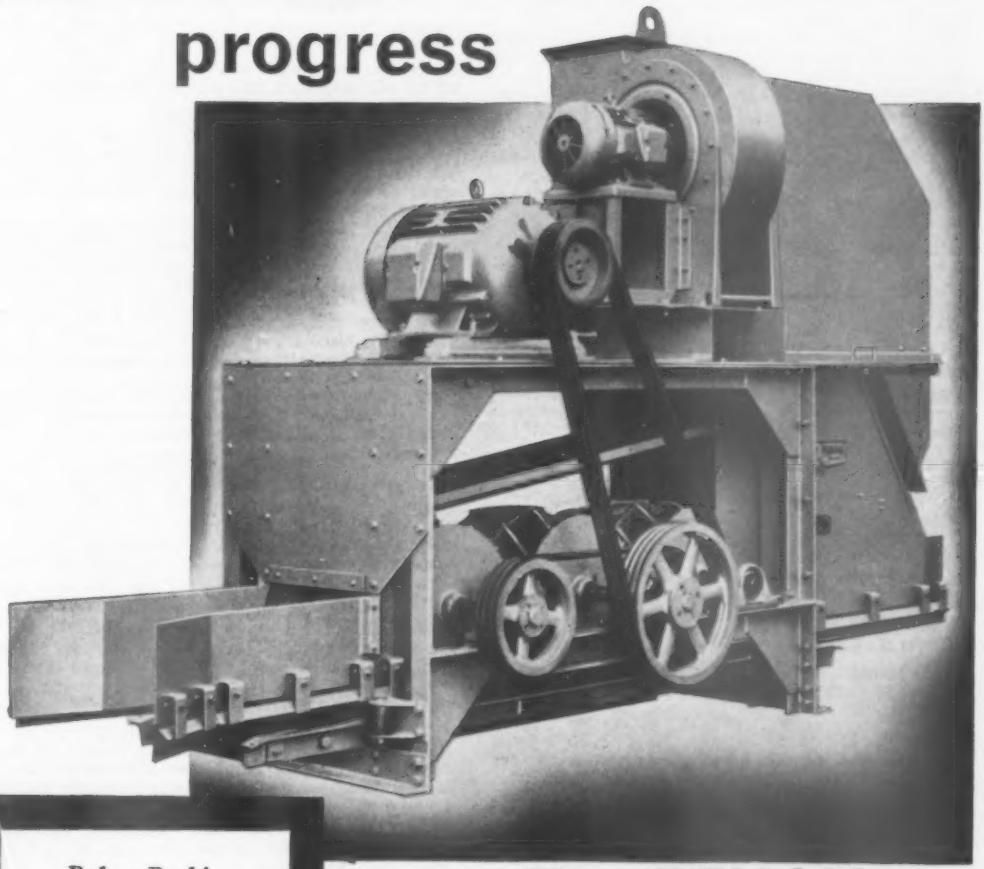
*A catalogue of films available from the Gas Council's Film Library lists no fewer than 40 titles, plus film strips and wall charts.

Die-casting Discussion Group

Following the success of the technical discussion meetings on die-casting practice and techniques arranged by the Zinc Alloy Die Casters' Association last winter, the first of this season's meetings was held on October 17. About 80 engineers from 16 member companies met in the new Council Room of the Birmingham Chamber of Commerce to discuss "metal melting and handling." The next meeting in the series will be in London on November 20 and details may be obtained from the Zinc Alloy Die Casters' Association, 34, Berkeley Square, London, W.1.

The death occurred suddenly last Monday of Mr. K. B. WEST, director and secretary of Foundry Equipment, Limited, Linslade Works, Leighton Buzzard, Beds, and Foundry Equipment and L. & Y. Holdings, Limited. He was aged 46.

pattern for progress



Baker Perkins
Foundry Machinery

The PEKAY aerator/coolerator

* Continuously processes and conditions foundry sand * Fits flat, troughed, horizontal or inclined rubber belt conveyors. * Specially designed undercarriage does not increase wear or tension on belt. * Cheaply and quickly installed. One of the range 10 tons to 450 tons. 18″ to 48″ wide belts. * Increases output and improves quality from existing mixing plant.

Write for further details of Baker Perkins Pekay Aerators/Coolerators to :

BAKER PERKINS LTD., ENGINEERS,
Foundry Machinery Department, Bedewell Division, Hebburn-on-Tyne, Co. Durham. Tel. Jarrow 897124

B.P.F. 14

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

November 8, 1961

PIG-IRON

* **Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

* **Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

* **Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

* **Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 10s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 14s.1d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 10½d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 9d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

* **Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0d.

* **Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

* **Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

* **Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £231 10s. 0d. to £231 15s. 0d.; three months, £231 10s. 0d. to £231 15s. 0d.; settlement, £231 15s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2½d. per lb. rods, 244s. 0d. per cwt. basis; 20 s.w.g., 379s. 0d. per cwt.

Tin.—Cash, £967 0s. 0d. to £967 10s. 0d.; three months £967 10s. 0d. to £968 0s. 0d.; settlement, £967 10s. 0d.

Lead (Refined Pig).—First half November, £60 15s. 0d. to £61 0s. 0d.; first half February £61 15s. 0d. to £62 0s. 0d. settlement, £61 0s. 0d.

Zinc.—First half November, £69 10s. 0d. to £69 12s. 6d. first half February, £70 15s. 0d. to £70 17s. 6d.; settlement; £69 12s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £109 2s. 6d., rolled zinc (boiler plates), all English destinations, £106 17s. 6d.; zinc oxide (Red Seal); d/d buyers' premises, £87 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes 1s. 9½d. per lb.; sheets to 10 w.g., 195s. 6d. per cwt.; wire, 2s. 8½d.; rolled metal, 195s. 6d. per cwt.

Brass (Brazing).—BS1400, SCB2, £177; SCB3, £173.

Brass (High Tensile).—BS1400, HTB1, £191; HTB2 £212; HTB3, £226.

Gunmetal.—BS1400, LG2, £210; LG3, £221; G1, 1½% £279; G1 ½% £294.

Phosphor Bronze.—BS1400, PB1 (AID released), £314; PB4 £301; BS1400, 90/10/1%, £299.

Leaded Phosphor Bronze.—BS1400, LPB1, £235.

Phosphor Bronze Strip, etc.—Strip, 300s. 3d. per cwt.; wire, 4s. 2½d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; chill cast bars, solids 3s. 5½d.; cored, 3s. 6½d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £60 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £238 AB2, £245.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.).

853,740. T. Masters & Sons (Park Foundry) Company, Limited, Park Foundry, Glover Street, West Bromwich.

Ingot casting machines. The pouring box is so mounted that its pouring spout can move over a circular path in a vertical plane parallel to the direction of travel of the mould—to effect the pouring operation at intervals synchronizing with the travel of the moulds.

853,757. R. W. Taccone, 28 Chautauqua Boulevard, Erie, Penna, USA.

Among the special advantages claimed for this inventor's improved foundry moulding machines are simplicity and cheapness coupled with high efficiency, and the fact that there is no sand spillage.

853,853/4/5. American Smelting & Refining Company, 120, Broadway, New York, USA.

These Patents relate to moulds and their use for casting metal, and in particular, to moulds for continuous casting of copper cakes (853,853). A moulding apparatus for continuously casting metals (853,854) contains a mould with a pocket open at one end to receive molten metal and open at the other end to discharge the solidified casting. Opposed longitudinal profile areas in the mould pocket converge towards the discharge end of the mould to provide tapers. Means are also claimed for vertically reciprocating this mould.

Patent No. 853,855 relates to a mould for continuously casting metals, which is similar to that claimed in the co-patent 853,854 except that the portion of the mould pocket adjacent to the exit end has a number of recesses forming projections between them. The tops of these projections have surfaces co-extensive with the walls of the mould pocket. Means are also provided for supplying the recesses with a fluid to contact the solidified casting as it emerges, thus cooling the surface of the casting below its plastic range while it is being supported by the projections.

853,940. Hooker Chemical Corporation, Niagara Falls, New York, USA.

A new phenolic-resin composition exhibiting low viscosity in the molten state which will cure rapidly and which may be used to produce rapid-curing moulding compositions exhibiting improved tensile strength in the completely cured state.

854,094. Oglebay Norton Company, 1400 Hanna Building, Cleveland, Ohio, USA.

Apparatus for removing a spent refractory veneer from the interior walls of a hot-top.

854,181. Graeme Mills Ready, 284-286, Sturt Street, South Melbourne, Victoria, Australia.

A simple, inexpensive and efficient method is claimed by this inventor for the manufacture of self-aligning bearings. These are of the type in which an insert with a spherical external surface, is arranged to co-operate with an internal spherical surface of a housing for the insert.

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

WORKS/FOUNDRY MANAGER (42) seeks position. Experienced all aspects non-ferrous, grey iron, jobbing, mechanised. Full control. Box WF166, FOUNDRY TRADE JOURNAL.

"KOLLENGUSS" PROCESS (German Brass Gravity Diecasting) Foundry Technician has complete "know how" available to interested firm. Principals only. Box KP147, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE seeks position. First class connections with users of non-ferrous grey iron castings. Box TR167, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST / ASSISTANT FOUNDRY MANAGER, aged 29, A.M.I.B.F., N.F.C. Diploma, seeks interesting progressive post. Experienced modern foundry methods, technical control and development. Box FM157, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE calling on Local Government Authorities, Civil Engineering Consultants, Civil Engineering and Public Works Contractors in London and adjacent Counties, seeks change. Box RC155, FOUNDRY TRADE JOURNAL.

TECHNICAL/SALES REPRESENTATIVE, well known Midlands, educated, good address, car, conscientious, keen, reliable, practical foundryman, technician, wants position at once. West Midlands. Box TS146, FOUNDRY TRADE JOURNAL.

WORKS MANAGER (39), A.M.I.P.E., A.M.I.B.F., fully conversant all aspects production and sales, requires executive position. West Midlands area preferred. Box WM148, FOUNDRY TRADE JOURNAL.

ESTABLISHED TECHNICAL SALES REPRESENTATIVE, available Jan. 1952. Will undertake sales of Foundry Plant, Chemical Compounds, Core Binders, etc. Excellent contacts in Midland area. Box ET154, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN, 51, well educated, married, life in trade, grey, malleable, non-ferrous, excellent technician, practical, keen, reliable, recommended; wants position immediately. West Midlands. Box FF145, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

STEEL SHOP FOREMAN required for Jobbing and Semi-mechanised Steel Foundry in Essex. Applicants must have practical experience in Modern Methods and Electric Arc Furnace practice. House available for successful applicant. Box SS151, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

REQUIRED, a first class REPRESENTATIVE to sell Foundry Coke, Pig Iron and other Foundry commodities, also Steel Bars, Sheets, Sections, etc. in South Yorkshire and Midland Counties.

A well-educated man of smart appearance essential, age 30/40 with practical experience and connections a great advantage. Box RA162, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN, aged between 25 and 45 with practical experience and good technical background, required for grey iron foundry in West Riding of Yorkshire using machine and plate moulded methods producing 20 tons per week. Superannuation scheme in operation. Write in first instance stating age, experience and salary required, to Box FF129, FOUNDRY TRADE JOURNAL.

MANAGER immediately required for old established jobbing foundry producing castings up to 4 tons. Manager would take complete control of foundry employing 10/12 men but would have clerical and office assistance. The right man would receive shares in the foundry as a bonus for successfully operating it as well as good salary. West Riding. Reply Box MI138, FOUNDRY TRADE JOURNAL.

THE Sandholme Iron Company which specialises in the manufacture of **Spheroidal Graphite and Alloy Iron Castings** of all kinds, wishes to engage a **FOUNDRY METALLURGIST.** The applicant should have had experience in this field and would be required to take charge of a laboratory and carry out some research and technical control in the foundry. Foundry experience would be desirable.

Please write in the first place giving age, experience and salary expected to:

THE MANAGING DIRECTOR,
THE SANDHOLME IRON CO. LTD.,
Todmorden, Lancs.

SITUATIONS VACANT—*contd.*

TECHNICAL REPRESENTATIVE required by a group of companies engaged in general engineering and in supply of grey and high duty iron castings and foundry plant, to handle sales over a wide area of Southern and Eastern England. The position offers considerable scope and interest with a salary of £1,200 per year plus a company car. Box TR144, FOUNDRY TRADE JOURNAL.

Vacancy for an Iron Foundry Manager

THE Department consists of a modern hematite ingot mould foundry using quantity production methods; an ingot mould foundry producing hematite moulds up to 65 tons and a general foundry producing general engineering castings of a weight range from some few pounds to 50/60 tons in hitest iron, grey iron and hematite. There are approximately 230 personnel in the Department and there is an excellent supervisory staff.

The successful applicant will be a fully apprentice-trained coremaker, moulder or patternmaker and have H.N.C. in Mechanical Engineering or Metallurgy as a minimum qualification. He will have had progressive promotion from Foreman to Assistant Manager with at least three to four years' experience in each position. He will also have a sound knowledge of ratefixing, planning and progress and will have had experience of Trade Union matters. He will take a very serious interest in apprentice training and have sound ability in handling personnel.

Applicants should give, in chronological order, full details of positions held, salaries earned, qualifications and experience. Those selected for interview will have the opportunity of discussing matters concerning salary, housing assistance, pension schemes, etc.

Age 32 to 48 years.

Applications should be addressed to THE GENERAL WORKS MANAGER, THE BRIGHTSIDE FOUNDRY & ENGINEERING CO. LTD., G.P.O. Box No. 118, Sheffield, 1.

SENIOR TECHNICAL SALES REPRESENTATIVE

required by well known Company producing PIG IRON. Responsibilities include complete control of outside sales and technical service to customers. Must have good existing contacts with foundry industry and be capable of maintaining and expanding the Company's sales. Technical knowledge and pleasing personality essential. Age limit 30/45. Commensurate salary minimum £2,000 per annum and pension scheme, car, travelling expenses and bonus scheme with regular annual increases.—Apply giving full references and details of previous experience etc., BOX ST163, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY PLANT MANUFACTURERS in Midlands require SENIOR DESIGN ENGINEER with experience of hot and cold blast cupolas, mechanised charging equipment, ladles, etc. Good prospects and working conditions in modern drawing office, pension scheme, canteen. Full details please in confidence to Box FP161, FOUNDRY TRADE JOURNAL.

METALLURGICAL LABORATORY ASSISTANT

required for Metallurgical contract in our Works Foundries. A knowledge of the production of Copper Base Alloys, Metallography and Pyrometry is desirable.

The conditions we offer are in line with the best modern practice and would be coupled with a salary commensurate with experience.

Please write The Personnel Officer,

J. STONE & CO. (PROPELLERS) LTD., Woolwich Rd., Charlton, S.E.7.

PROGRESSIVE Company require REPRESENTATIVE to cover Southern England and Midlands area for sale of Iron Castings and engineering services. Technical experience desirable but personal qualities will be of foremost importance. Good salary and a car provided by the company. Apply to LAWFORD IRONWORKS LTD., Manningtree, Essex.

FOUNDRY TECHNICIAN required, age 26-35. Should have basic training and good technical education including laboratory experience. Experience in copper based alloys essential and the ability to undertake investigations and initiate original development work in the foundry a principal requirement. Salary according to qualifications. Write stating age, qualifications and experience to GENERAL MANAGER, c/o Box FT158, FOUNDRY TRADE JOURNAL.

SALES MANAGER

Ironfounders and Engineers

A large group of foundries in the West Midlands wish to appoint a Sales Manager. Applicants must be of pleasing personality, between the ages of 30 and 45 and must have already held a similar position. A good technical background is essential.

A high salary will be paid and a company car provided.

This is an unusual opportunity and only capable men should apply.

Full details to Managing Director, Box SM150, FOUNDRY TRADE JOURNAL.

METALLURGIST required for Malleable Foundry producing 100 tons per week of Blackheart and Whiteheart. This is an important position for which a good salary will be paid to the right man. Candidates should be at least 35 years of age and fully experienced in all techniques of melting and annealing. Applicants must be prepared to accept full responsibility for all aspects of the Technical Processes in the production of Malleable Castings and be able to produce results. Only candidates with the requisite experience will be interviewed so please give full and complete details of experience and salary required in the first instance. Box MR134, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY ASSISTANT FOREMAN, grey iron, experienced sand, cupola control, machine moulding, etc. Reply stating experience and salary required, etc., to HIGGS MOTORS LIMITED, Witton, Birmingham, 6.

TECHNICAL REPRESENTATIVE required by Foundry Suppliers for Scotland. Applicants should be between 25 and 35 years of age although younger men may be considered. Must have sound education with practical foundry and core-shop experience. Appointment w.e.f. 1st January, 1962. Starting salary £750 p.a. with bonuses and expenses. Car provided. Opportunity of rapid progress. Box TR149, FOUNDRY TRADE JOURNAL.

NEWTON CHAMBERS & COMPANY LIMITED

THORNCLIFFE, NEAR SHEFFIELD.

MECHANISED FOUNDRY SUPERVISOR

The Company invites applications for a supervisory position in their Redfyre Foundry. There are over 200 employees in the foundry which specialises in castings, light engineering and castings for vitreous enamelling. It is essential that applicants have experience of modern foundry practice on mechanised plant methods and have produced castings of high quality suitable for the enamelling process.

Applicants should be aged 40 years or under. Salary and working conditions are good—contributory pension scheme. Please reply in writing giving full details of age, education and experience to the Personnel Officer.

PATTERNMAKING, Wolverhampton. Good opportunity owing to retirement for practical man with progressive ability and capital to join existing old-established business with present foreman. Box PW156, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNICIAN for grey iron foundry, producing plate and cored castings up to 10 cwt. Young man aged about 30 preferred, with experience in Sand Rammer and Jolt Squeeze machines, green sand and CO$_2$ production methods. Quality control activities will be main responsibility. National Foundry College training an advantage. Apply PERSONNEL OFFICE, THOMAS POTTERTON LTD., Emscote Road, Warwick.

MASTER PATTERN SHOP, situated large Midlands town, require experienced MAN to take charge of and expand pressure cast pattern plate foundry. Must be capable of training staff and estimating costs. Aluminium sand foundry experience an advantage. The position will be progressive with Pension Scheme and salary commensurate with capabilities. Write giving full details of experience and initial salary required to: Box MP168, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required to take complete charge of production for Non-ferrous Foundry specialising in Aluminium Sand and Gravity Die Castings. Employing 250 men with intentions of substantial expansion. Must be fully qualified and experienced in all aspects of Gravity Die Casting. Foundry includes fully approved Laboratory. The Company operates a complete individual Piece-work system with modern methods of production control. House available and Pension Scheme. Age between 35 and 45. Salary according to experience up to £2,000 p.a. Box FM153, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

EXPERIENCED FLOOR MOULDERS wanted. Good wages and bonus paid. Overtime worked. Apply WALTER W. HOSKEN, LTD., 62, Willow Walk, Bermondsey, S.E.1.

SALES REPRESENTATIVE for Coke and Iron in the Midlands Area—technical knowledge an advantage. Please give full particulars, age, etc. Box SR159, FOUNDRY TRADE JOURNAL.

AGENTS

SMALL West Midlands Grey Iron Foundry wishing to expand seeks AGENTS to introduce repetition work, commission only basis. Foundry capable of competitive prices and efficient deliveries. Box SW28, FOUNDRY TRADE JOURNAL.

BUSINESS OPPORTUNITIES

ADVERTISER seeks active interest in small Non-ferrous Foundry. London area preferred. Practical man. Box AS152, FOUNDRY TRADE JOURNAL.

NON-FERROUS FOUNDRY, long established with excellent connections in London and southern area. Turnover at present £60,000 p.a. capable of easy expansion. Order book stands at £30,000. Sand castings only. All reasonable propositions considered. Box NF164, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED: 30 in. Disc and Bobbin Sanding Machine (or vertical bobbin only). Also Recessor, preferably "Wadkin" "LQ." DALTONS, Canal Street, Nottingham.

WANTED.—Chill Moulds suitable for solid and cored non-ferrous stick castings ½ in. to 4 in. dia., new or second-hand, ready for use. Box WC142, FOUNDRY TRADE JOURNAL.

WANTED: 10 cwt. Skip-type Cupola Charging Machine. Please state price and full particulars. MESSRS. J. C. HULSE & CO., LTD., Hinkshay Foundry, Dawley, Shropshire.

Cleveland Plant and Machinery Co., Ltd.,

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Surplus Foundry Plant and Forging Equipment

Best prices given

Wharncliffe House 44 Bank Street Sheffield, 1

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MACHINERY WANTED—contd.

STERLING or Sterling type steel moulding boxes required. Must be in good condition. Sizes from 12 in. × 12 in. × 4 in. deep upwards. IRCAST FOUNDRIES, LTD., Underbank Mills, Whitworth, Rochdale. Telephone: Whitworth 3223.

WANTED: SAND MILL, 3-4 tons per hour capacity, preferably with bucket loader and disintegrator. CAMBRIAN CASTINGS LIMITED, Hirwaun Industrial Trading Estate, Rhigos, Aberdare, GLAM.

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SAND MIXERS and DISINTEGRATORS for Foundry and Quarry; capacities from 10 cwts. to 10 tons per hr.—W. & A. E. BERSALEY (MACHINERY), LTD., Misterton, nr. Doncaster. Tel.: Misterton 202

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TWO "COLEMAN" CN type Moulding Machines for sale, in as-new condition. Reasonable price. Box TC165, FOUNDRY TRADE JOURNAL.

FOR SALE. One 2 ton per hour cupola, complete with blower fan and blast, main inclined skip type semi automatic charger. Including one complete set of firebrick lining and all electric equipment for 415 volts, 3 phase, 50 cycles supply. Drop bottom 4 tuyeres. Box FS160, FOUNDRY TRADE JOURNAL.

PAN MILLS. 4 ft. and 5 ft. dia. underdriven, stationary pans, self-discharging, new, for delivery from stock. W. & A. E. BERSALEY (MACHINERY), LTD., Misterton, nr. Doncaster. Tel. Misterton 202.

HAND Operated Overhead Travelling Cranes built to your requirements, competitive prices and early delivery. Second-hand Electric Hoist Blocks from 5 cwt. to 5 ton in stock, competitive prices. Apply: FRANK SALT & Co., LTD., Station Road, Blackheath, B'ham. Phone: Blackheath 1635.

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9 FT. radius sand slinger by Foundry Plant and Machinery, 3 motors, 400/3/50.
Linslade No. 1 sand slinger, 10 ft. radius, 2 motors, 400/3/50.
Collin 10 tons geared foundry crane ladle.
New geared crane ladle, 10 cwt. 5 ton cap.
B.M.M. moulding machines. HPL 1 jolt squeeze pattern draw, 26 in. × 18 in. HPL 3 jolt squeeze pattern draw, 35 in. × 25 in. RD5 jolt squeeze turnover, 48 in. × 30 in. BT5 jolt squeeze turnover, 36 in. × 28 in.
Coleman Wallwork jolt squeeze straight draw moulding machines, WT563C, cable 35 in. × 24 in. WT565 cable 22½ in. × 19 in.
Self contained coke fired oven, 2 compartments each 18½ in. wide × 52 in. high × 36 6/F.
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Also air compressors, all sizes, new and secondhand; cupola blowing and extraction fans; shot blast equipment, etc.; our stocks are constantly changing. Please send us your enquiries.

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ONE Sand Wizard Barrel type Shotblasting Machine. Good working order. Apply: CASTLE FOUNDRY (KEIGHLEY) LIMITED, Becks Road, Keighley, Yorkshire.

"WADKIN" "WX" Universal Pattern Miller with 6 spindle speeds, new 1962, perfect order. DALTONS, Canal Street, Nottingham.

STERLING SHAKEOUT, 6 ft. × 4 ft., complete with 15 h.p. motor. Good order.
Jackman 94A Coreblower, complete and in excellent condition.
Two Coleman R2 Coreblowers.
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Jackman Hand Squeeze Moulding Machine.
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New Tested Chain Slings, double leg, 30-cwt. to 50-cwts.
Morgan Gas-fired Bale-out Furnace, 100 lbs. capacity.
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Few Roper Ladles and Roper Ladle Hoists, 3 and 5-cwt. capacity.
New Bale-out and Lift-out Furnaces. Please send for illustrated leaflets.
Monometer 800 lb. Aluminium capacity Rotary Furnace.
Large stock of Small Moulding Boxes at low prices to clear. List on request.
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OIL COOLERS. Six. Heenan and Froude, T.61. Complete with motors and fans. As new. Apply: H. BRIDGES, Contractors, Kingsbury Road, Minworth, Sutton Coldfield. Telephone Ashfield 2071/2.

CORE BLOWERS:
FOUNDRY Equipment R2. "Titan" 75 lbs.
CORE EXTRUDERS:
Bench Type, table 17 in. × 14 in.
Fordath "Junior," 3/50/400 V.
Fordath "Multiplunger," 3/50/400 V.
SAND MIXERS:
FORDATH No. 1, 12 in. dia. pan, 3/50/400 V.
HERBERT MORRIS "MULBARO" portable pneu. tyred wheels, 3/50/400 V.
SPERMOLIN, scroll type, motorised.
FURNACES:
MORGAN Oil-fired, 15 cwt. cap.
MONOMETER Rotary, 1 and 2 ton cap.
NU-WAY Bale-Out Oil-F., 200/250 lbs.
Gas-fired, 100, 150, 300 and 400 lb. capacity, various makes.
GEARED FOUNDRY LADLES.
Power Hammers.
BLOWING AND EXHAUSTING FANS.
Send us your enquiries for ALL TYPES of Foundry Plant and Equipment.

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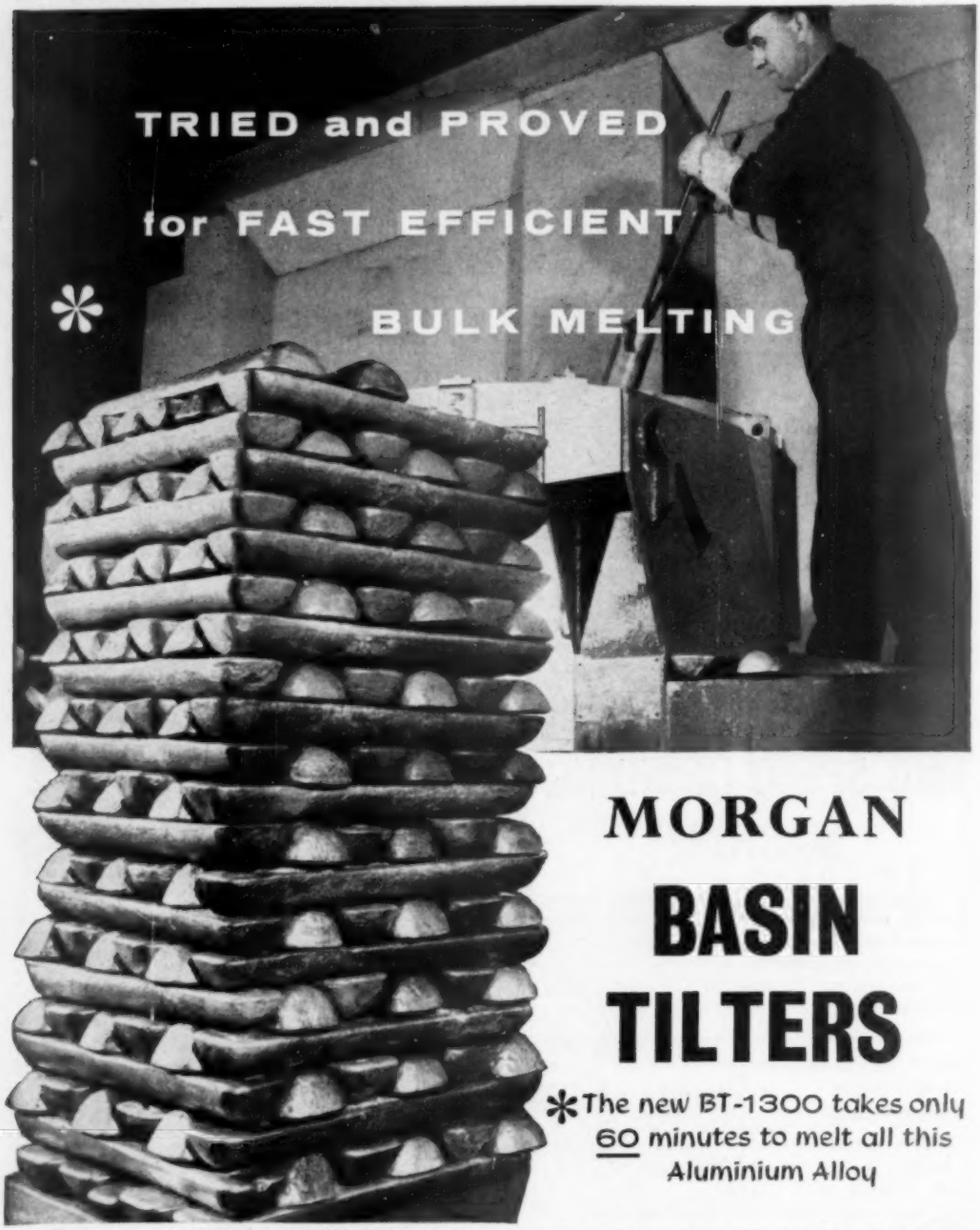

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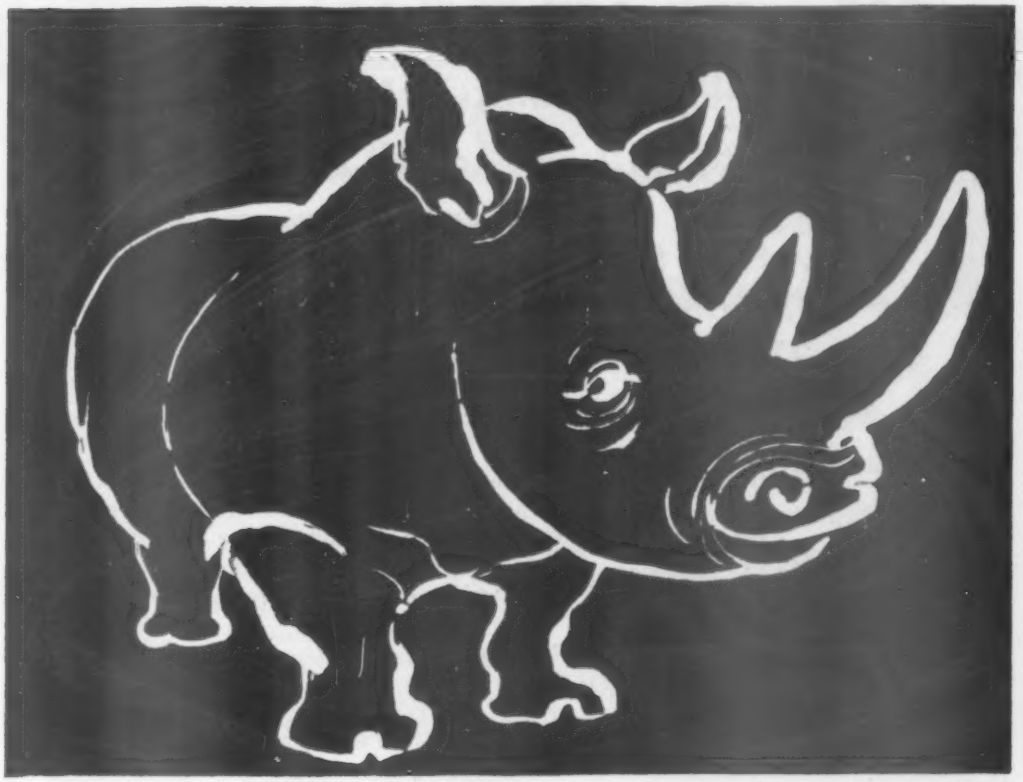

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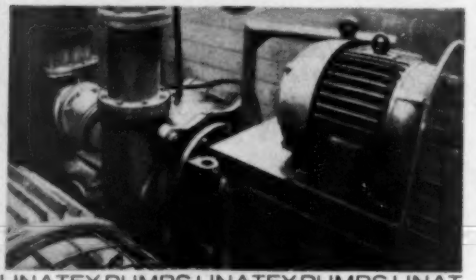

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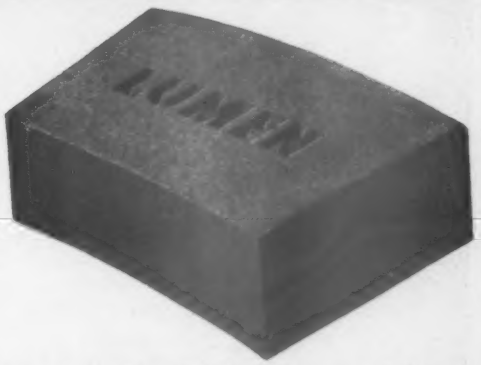

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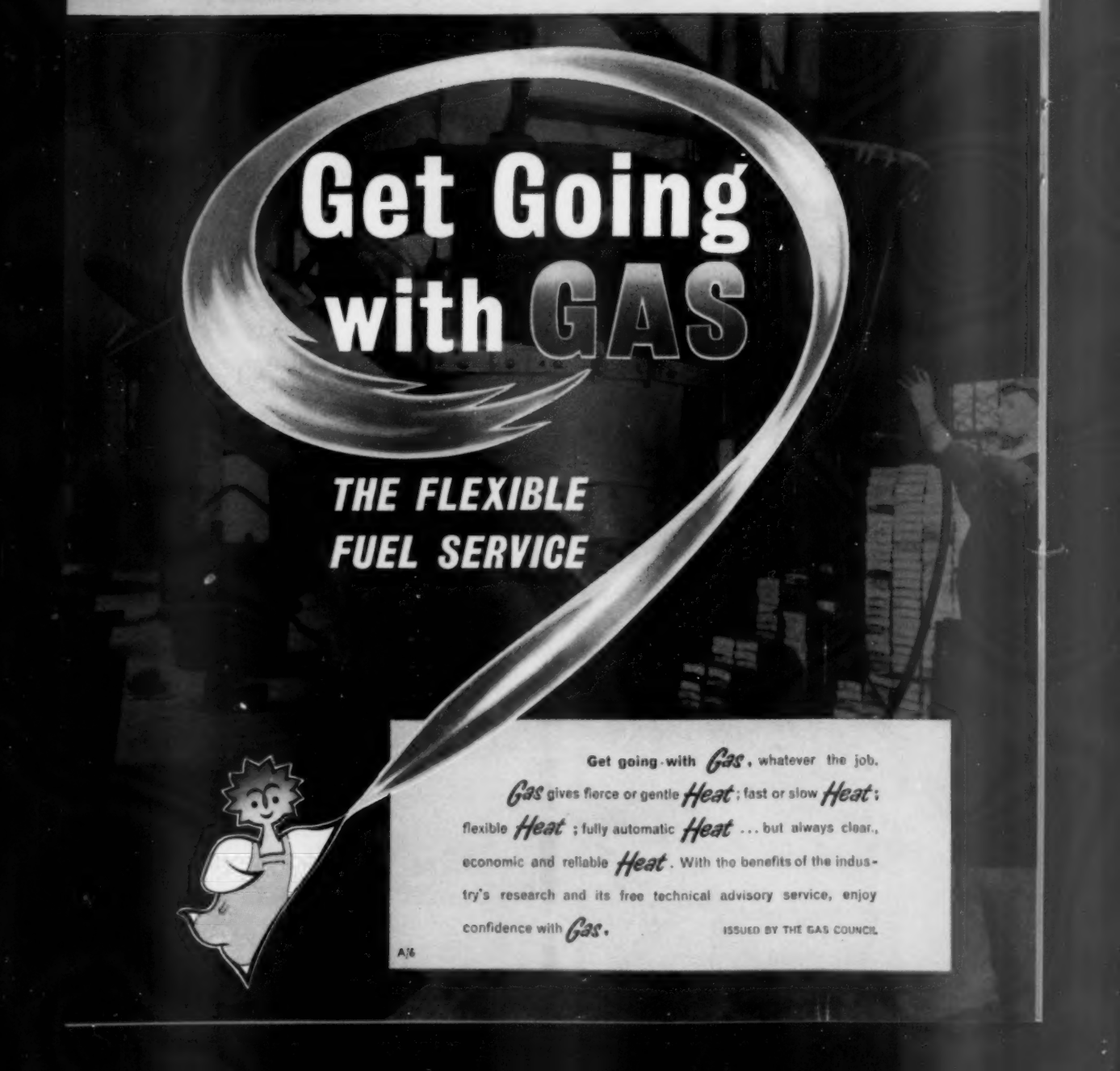
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